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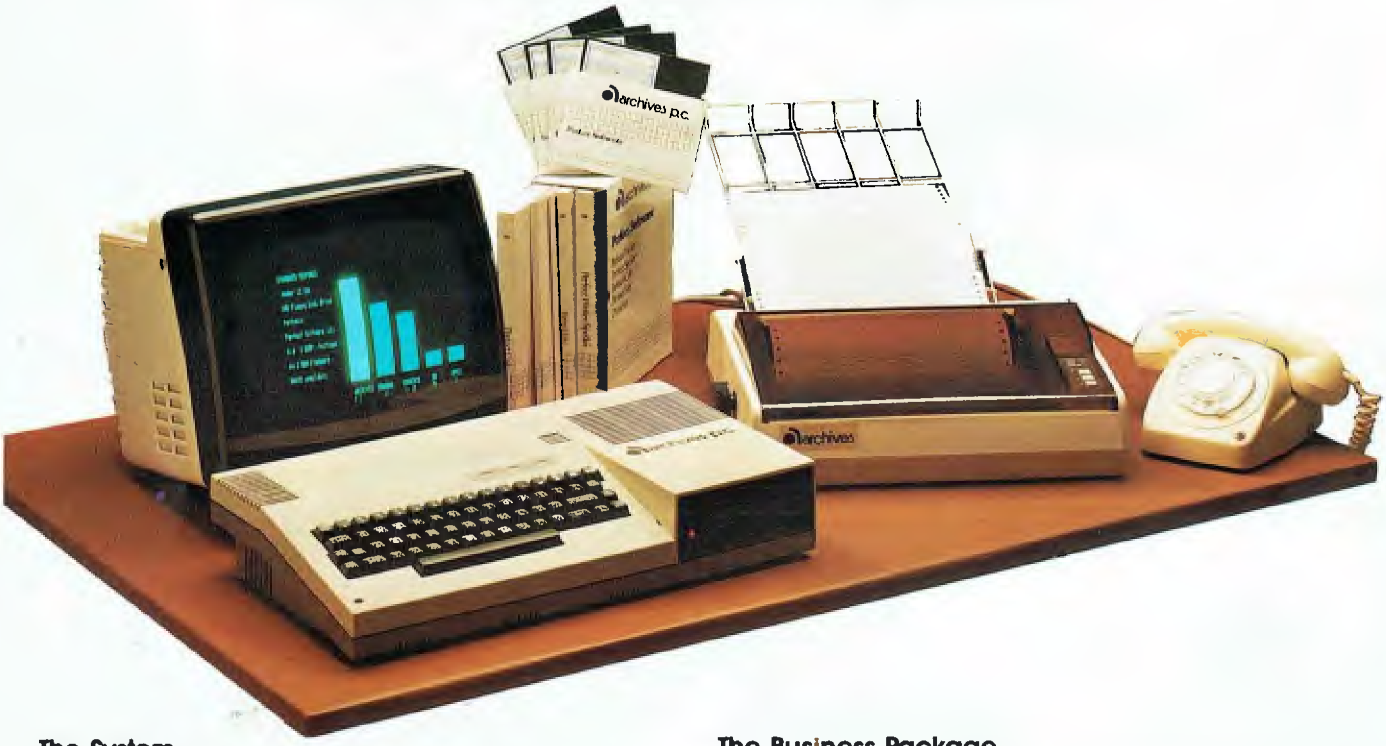

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William Horwood explains why you should look further than dollars and cents when you think about micros

HOW CAN YOU FIND THE BEST SOFTWARE?
Fiona Newman provides some pointers to help you choose

POPULAR PACKAGES
A handy guide to some of the best selling software

RUNNING ORDER
Operating systems explained

SHOULD YOU GO TO AN AUTHORISED DEALER?
Fiona Newman finds out how much — or how little — a manufacturer's seal of approval can mean

HOW SHOULD YOU TALK TO A COMPUTER SALESMAN?
Use Fiona Newman's questions to get the information you need

HOW TO KEEP TRACK OF THE EXTRAS
William Horwood tots up all the bits and pieces that can add to the cost of a computer

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The home computer king produces a revolutionary new business machine and *ABC* is first in Australia with a comprehensive preview.

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We look at a whole new dimension in spreadsheeting.

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Cheap but effective word processing.

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The serious operating system on a chip.

3D on PC

A software product allowing architects and engineers to design and model in three dimensions on the IBM Personal Computer has been announced by Sourceware Pty Ltd.

Called MicroCAD, it was developed by Computer Aided Design in San Francisco. It is expected to retail in Australia for around $1100.

The Managing Director of Sourceware, Mr Doug Ruttan, said "MicroCAD made it possible to design complex projects and models in three dimensions on microcomputers, bringing computer aided design within reach of all architects, engineers and designers".

He also expected it to be used by interior designers, furniture designers, landscapers., manufacturers and educators.

MicroCAD allows users to build a collection of three-dimensional objects and recall them in any combination. Images may be moved anywhere in 3D space and rotated there, changed in size and viewed in perspective. Images can be labelled on the screen. Co-ordinates, bearings and line lengths can be edited on a monochrome screen while viewing the constructions on a colour graphics monitor.

MicroCAD is designed to run on an IBM PC or IBM XT with a minimum 128k RAM using two disk drives.

For more information contact Sourceware on (02) 411 5711.

New multi-user system from Televideo

Data Peripherals has announced the release of a new four user computer system integrated into a single desktop enclosure: the Televideo TS804. It can support up to four users, a wide selection of peripherals and a choice of three operating systems (MP/M II, OASIS and CP/M PLUS).

The architecture of the TS804 features a 4MHz Z80A cpu with concurrent DMA, intelligent disk controllers, 19.2k baud RS-232C channels, single instruction memory mapping, a 320k RAM, and a disk cache for high speed storage access.

Brian Killin, Managing Director of Data Peripherals said "the TS804 offers a number of growth path alternatives and represents a breakthrough in cost per user, high performance and versatility. In addition to being a multi-user system, the TS804 can be configured to operate as a high performance, single user computer under the CP/M plus operating system. Users can then upgrade their application software to a multi user environment under MP/M II at a later date".

The list price of the Televideo TS804 has been set at $6,995 excluding sales tax. This price will include as standard a 10 Mbyte hard disk, a 1 Mbyte floppy disk, 320k RAM and the MP/M II operating system.

Commodore sets record

Commodore International Limited has had another record 3 months to the end of December — and a record 6 month period.

Commodore's Chairman of the Board, Mr Irving Gould, announced that the company has achieved record sales, net income and earnings per share for the December quarter and for the half year period. The group's sales for the quarter rose to a record $468.5 million — more than $217 million above the previous record and 144.7% above the same period the previous year of $191.6 million (the previous record).

Sales for the half year to December 31, 1983 rose to a record $696.4 million — 129.1% above last year's first half sales of $303.9 million. In fact the sales for the last 6 months of 1983 almost equalled Commodore's record sales for the entire year of 1982-83 — $740.4 million.

Mr Gould said net income and earnings per share for both the second quarter and the 6 months period ended last December were also at record levels — both of them well over 100% above the levels for the same period the previous year.

Australia has made a significant contribution to the Commodore result: the Managing Director of Commodore's Australian Subsidiary, Commodore Business Machines, Mr Nigel Shepherd said, "Sales in Australia during the last 6 months of last year had risen about 150% on the same period the previous year. Commodore's computer sales had boomed to a record 75,000 during the 6 month period. This makes Commodore the largest selling computers in Australia today."

Network for Eagle and IBM PC

Eagle Computer has announced the addition of EagleNet I, a local area network capable of expanding to 255 stations, to its line of IBM PC and XT compatible computers. EagleNet I converts two or more 16-bit personal computers into a network to share information, databases, and a host of peripherals.

"EagleNet I provides an upward path for Eagle and IBM customers who require an office system of greater capacity and need to transfer information electronically from computer to computer within a local network," said John Fox, ATM Managing Director (Australian distributors of Eagle Computer). "The EagleNet I user is assured of the field proven ARCNET standard, the world's most widely used network system."

With a network, users can share letter quality printers, plotters, hard disk storage units, and other peripherals alleviating the need to purchase this equipment for each single computer in their offices.

EagleMail, the electronic mail software included free of charge with the network, ties the personal computers into an information system. With this electronic mail feature, users can transmit messages, files, documents, spreadsheets, etc from station to station. An optional database software package will be available during the second quarter of this year. Fox stated that, "EagleMail is a sophisticated networking electronic mail system and the availability of this product carries as much significance as EagleNet".

The EagleNet I Starter Kit, a network for two personal computers, ready to connect and use, is priced at $3,390. The kit includes two EagleLink I adaptor boards, one junction, network software, EagleMail I, FlexMenu, and two 6 metre lengths of cable. Additional EagleLink I adaptor boards are priced at $1,180 each.

Software for Anadex emulates IBM PC Graphics Printer

An emulation diskette, which allows an IBM PC or PC look-alike to run existing IBM Graphics Printer software on an Anadex DP9625A/B or DP6500 printer, is now available from Datascape.

The diskette — supplied free with each Anadex printer — allows demonstration of the performance of Anadex printers using existing IBM Graphics Printer software. A simple keystroke command permits you to switch back to the conventional Anadex operation, giving you the best of both worlds.

Mr Steve Chapman, Marketing Manager of Datascape, said "the diskette's advantages included: higher print speeds than with the IBM Graphics Printer, better print quality, instant compatibility with software designed for the IBM printer without sacrificing the rugged, continuous-duty operation of Anadex printers".

1-2-3-4?

An integrated software package for personal computers that is a successor to the popular Lotus 1-2-3 has been announced by Sourceware.

The product, named Symphony, was developed by the 1-2-3 producers, Lotus Development Corporation, of Boston, and will initially be available only for the IBM PC and XT computers. Symphony will be released in June and become available in Australia about the same time.

Mr Doug Ruttan, Managing Director of Sourceware, which will distribute Symphony in Australia, said he expected it to make as big an impact as Lotus 1-2-3, which became the most popular software among IBM PC users worldwide.

Symphony combines spreadsheet, graphics, enhanced database management and full word processing capabilities, and makes extensive use of "windowing". It is fully RAM-based with no disk overlays and needs a minimum memory of 320k.

One interesting feature is that it has interfaces to support third party software, such as statistical packages and spelling dictionaries.

"Lotus is hoping that users and vendors will develop add-on facilities for Symphony", Mr Ruttan said. He said he expected the Australian price of Symphony to be between $1100 and $1200.

Lotus Development Corporation has stated that it will offer a system upgrade plan which will cost the existing users of 1-2-3 only $US200. Registered Australian users can take advantage of this plan through Sourceware.

ACT moves in as Victor fails

Victor Technologies, manufacturer of the Sirius, has entered its final death throes as the firm's creditors took formal steps to have the company wound up.

But ACT, which distributes the machine in the UK and is Victor's largest customer, is confident that the machine will continue to be made and that existing users will not suffer because of Victor's demise.

Victor ran into financial difficulties following the launch of the IBM PC in the US. Victor found itself unable to compete against the marketing might and selling power of a product bearing the IBM label.

With debts around $100 million, Victor has sought protection from its creditors under chapter 11 of the United States bankruptcy laws. The creditors had filed to have the company wound up.

ACT has reacted by sending a team of directors to the US to negotiate to buy the manufacturing rights to the machine. It is not the only bidder — ACT's partner in the Far East, Swire Pacific, is also interested as are a number of other international corporations.

'We are confident that the sale of manufacturing rights will be completed very shortly,' said Peter Oldershaw, an ACT director, 'probably in less than a month'.

ACT is well placed to manufacture the machine. Under an existing agreement with Victor it manufactured a trial batch of machines at its new factory in Scotland.

The factory was originally built to make the new ACT Apricot and ACT has recently extended it by 50 per cent.

Mr Oldershaw refused to say whether this was the likely option. 'We would rather not say at this stage where we would carry out the manufacturing. Let's sort out the manufacturing rights first,' he commented.

MSX code in dispute

A controversy over the Spectravideo 318 and 328 systems has highlighted what could be a fatal weakness in Microsoft's attempt to establish a home computer standard with MSX.

The idea of MSX is that a number of micros with similar Basics can use the same peripherals and ROM cartridges. MSX is coming, but in this country the nearest thing to an MSX machine is the Spectravideo 318/328 and now it transpires that this design, although '99 per cent MSX compatible', is not compatible with the MSX standard for peripherals or ROM cartridges.

The Anadex Printer from Datascape on which the new Emulation Diskette runs.

Stectravideo — standard bearer or weak link in the MSX drive?

The kernel of the problem seems to be that the Spectravideo machines have non-standard printer interfaces, and take non-standard cartridges, and standardisation in these areas is crucial to MSX.

Can they actually be termed MSX machines? A Spectravideo spokesman claimed that the Spectravideo 318 and 328 machines had actually been MSX standard when the standard was first arranged, but that after the machines had come into production, the standard had been changed. The machine was originally launched with an MSX flourish — this attribute was loudly trumpeted in the initial advertising, although this was drawn up by Spectravideo itself, not the Australian importers.

But here is the crunch —if the standard is so ephemeral that it caused Spectravideo to foul up the supposed standard in the first place — how can is be sure that the standard will turn out to be any easier to pin down second time round?

Taiwan rotten Apples jugged

Apple has won an important victory over Taiwanese manufacturers of what have become known as 'rotten Apples'.

As a result of a district court judgment six Taipei businessmen actually face prison sentences of eight months for breaching the copyright on Applesoft Basic and the AutoStart ROM.

This decision comes a month after the US company won a criminal suit against two other Taiwanese companies, but in that case the sentences were suspended. In the case settled recently the defendants plan to appeal against the sentence and could yet avoid jail.

Apple faces Redskins' fate in Superbowl

By Chris Rowley in the USA

My sources tell me a certain amount of American football has been blitzing across your television screens recently. Alas, this year's Superbowl was a bit of a dud — the equivalent of Carlton beating St Kilda 100-12 in a Grand Final.

Much more electrifying than the game, at least for that sizeable number of viewers interested in micros, was the intermittent battle of the micro advertisements.

Apple, IBM, Atari — every time they cut back from a mountain of helmeted muscle for another $800,000's worth of the primest time of all, there was Alan Alda or Charlie Chaplin thrusting keyboards at you. By all accounts Apple's $400,000 extravaganza, in which the young female athlete in Apple-coloured shorts flies through colourless Kafka-esque corridors to the room of 300 dusty grey-clad extras and the huge talking head, is becoming a video freak collector's item.

Apple is to spend $25 million on the Mac campaign, while IBM will splash out $40 million to introduce the PCJr.

Certainly the Mac has struck sparks aplenty from the media. Neat as a gazelle at 25lbs and $2,500 it has dominated the computer press; indeed through all the Mac chatter there has been hardly a peep about the Sinclair QL. One reason for all the attention is the knowledge that the Mac might be Apple's last big shot, and that it must do well among small business buyers to stand a chance and assure us of a world that is not simply IBM-compatible. So a lot of thought has gone into the Mac, from the three years spent on the ultra-tight 64k ROM code to the planning of the $20 million super-automated MacFactory which can churn out one million Macs a year and beat even the Japanese on the assembly line.

Advanced Cuteness Note: Mac's name originally came from staff mis-spelling the fruit, which is 'Mc' — Apple also dropped the original names for MacDraw and Mac-Write, Macelangelo and Macauthor.

But as far as computer buyers for Fortune 1000 companies are concerned it already is an IBM world. A recent survey found that 67 per cent of such executives would automatically choose an IBM PC, and despite shortages of PCJrs announced by IBM, analysts expect 750,000 Juniors to be sold this year along with two million PCs. By contrast, Apple is expected to move 400,000 Macs in the same period.

The 24,000 elite purchasers of the $10,000 Lisa edition 1 were given a free upgrade. It should be noted — through the barrage of MacWares — that the microsoft-designed Mac basic runs ten times faster than MBasic on the PC. We should also note that IBM is rushing out its PC Unix system for this spring, and that Unix is by far the most popular operating system on US campuses. Nor should we overlook last week's announcement from AT&T of an enhanced Unix specially slanted for software development on the Motorola 68000.

IBM, however, is developing the market in many different ways. An IBM lap machine for $1,000 is said to be in the works; it will use the Harris CMOS 8088 chip and Sharp's 80 by 16 display, and be PC-compatible. IBM thus intends to battle the Japanese onslaught of PC-compatible book-size machines being prepared for next Christmas.

But there was also plenty of activity elsewhere in the micro world — dozens of hardware offerings, hundreds of software. The Murdoch/Warners/Chris Kraft struggle continues, both on Wall St and in the courts. Mattel, which took a battering in the micro arena last year, returned the rights on its Aquarius to its developer, Radifon Electronics, and laid off more workers. Industry observers predict Mattel will leave the market.

In Las Vegas, home of the

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overkill, electronics show folk were reportedly 'grossed-out' by Spectravideo's low-end markting style as it cut Coleco Adams in half with chain saws and threw Cabbage Patch Dolls into a handily placed toilet.

Compatibility trail goes cold in Tokyo

By Serge Powell In Japan

'Your assignment, should you choose to accept it, is to investigate rumours that deep in secret laboratories our arch foe, Japan Inc, is about to start cloning the IBM PC.'

This is the kind of job that calls for Fedora and a cigarette dangling from a stiff upper lip. The upper lip is no problem — outside snow is falling for the first time in 14 years and upper lips are not only stiff, but blue with cold.

On Tokyo's mean streets the first place to look for a lead is the local software pusher. After all, he's the man everybody turns to when they need a quick fix of word processing, database management, or operating systems. He'd know what sort of deals are going down in this town if anybody would.

But you don't get something for nothing, particularly where software is concerned. I crossed his palm with a yen but when that proved insufficient I greased his palm with ten of them and asked him: 'Compatibility?'

Only three worth mentioning, he told me, at least of local manufacture. Hitachi MB-16, Toshiba Pasopia-16, and Sanyo MBC-555.

This didn't seem like a tenner's worth but he didn't have much more. 'There is plenty of OEM work going on for US companies from small and not-so-small manufacturers, but most are blowing a lot of smoke and covering their tracks,' he said.

Well thanks, but no thanks. I decided on a different approach: perhaps the resident chip-heads could come up with some better answers. On asking around I managed to corner the addicted mainframe mainliner of the local IBM User club and questioned him: 'Compatibility?'

Eagle, Compaq, Hyperion . . . that's what they're all talking about.

I cut him off; we've all been through that loop before. 'What about local manufacture?' I said. Error trap. 'It's this way. Apart from Sanyo they don't want their brand names to be seen slavishly following the market leader. Besides, having taken so long to catch on to CP/M, they figure the future may lie with CP/M-86 (unless they're shipping something else overseas and not telling us about it).'

There was one final hope in tracking down the cloning laboratories that everybody talks about but nobody knows. There is a Mr Big who cracked the retail trade when the Japanese retailers didn't know CP/M from ABC; he moved in with a Z80 machine and cornered the English language word processing market. Brochures, service manuals, advertising material for the export market — big volumes, big money, hence his name. And he did it with a Sanyo.

The chances were good that he'd be doing the same with a Japanese IBM-compatible. I staggered stagily into his shop: 'Clone . . . IBM . . . Japanese' I gasped.

'Sanyo . . . six months,' he smiled, 'but let me show you . . .'

'Bundled?' I interrupted.

'Not for domestic users,' he said as though dictating to a tape recorder. 'But let me show you a really nice US model . . .' I fled.

On the way back to the office I tried to piece things together. Basically, the Japanese still don't understand the applications preoccupation of western users. Until they do they probably won't understand the need for compatibility with the market leader.

This is a form of cosmetic high technology of cloning. And this is what I was going to report until I noticed that a new and anonymous disk had appeared on my desk. I put it into the drive.

This is a form of cosmetic high technology and no relation at all to the biological high technology of cloning. And this is what I was going to report until I noticed that a new and anonymous disk had appeared on my desk. I put it into the drive.

'There are rumours circulating to the effect that Japan Inc is now investigating the possibility of a Macintosh-compatible system. Your assignment, should you choose to . . .'

I pulled out the .45 from the drawer it shares with a bottle of whisky and shot the computer in the drives from close range. Enough is enough.

Unix universal

The recognition of Unix as standard operating system for 16-bit and 32-bit computers took a big step forward following two separate announcements.

IBM said it will offer Unix, under the name PC/IX, for the PC in April in the US, and Digital Reserach released details of an agreement with AT&T under whose umbrella Unix was devised to develop a library of applications software for programmers and end users.

But there are divergencies in approach. In keeping with the PC philosophy of using proven — some would say out-of-date — technology, IBM has opted for an implementation of Unix System III.

Digital Research, meanwhile, will be concentrating its efforts on the latest version, System V, and the one designed by AT&T to be the commercial standard.

The significance of this decision is that AT&T has already signed agreements with the major chip manufacturers to standardise on System V.

Digital Research is already involved in this and is doing the 'port' on to the 286 chip for Intel. Motorola is doing its own port for the 68000 family of processors.

IBM's decision to implement a version of Unix on the PC opens a range of technical and scientific software for PC users as well as giving the Big Blue's seal of approval to the multi-tasking, multi-user operating system.

Interestingly, IBM has not opted for either of the two leading commercial implementations, Xenix from Microsoft and UniPlus from UniSoft. Instead it has gone to Interactive Systems, a small California based software house.

The indications are that IBM is avoiding dependence on the one software company. The company is working on other versions of Unix for use on mainframes and other products.

In true IBM fashion it is not revealing any details nor will it discuss what operating system will be used on its present project, the Popcorn, believed to be based on the Intel 80186. Some IBMwatchers say Microsoft is not involved.

MSDOS now served on chips

After CP/M on a chip it now looks as though MSDOS on a chip will be a reality before the year is out.

Interestingly, the company producing the chip is mighty Intel which also manufactures the 8088 processor chip used in IBM-PC and IBM look-alikes.

The move by the company puts the final seal on MSDOS's claim to be the standard operating system for 16-bit micros. With the ready availability of the chip and its compatibility with the 8088 and 8086 processor chips it provides manufacturers with an easy route to building a micro to compete with the IBM PC — although the differences between PCDOS and MSDOS may grow as the year progresses.

Having the operating system on a chip avoids the cost and complications of having to build disk drives into a machine.

The main game for users is that it now makes it possible to build portable micros using MSDOS that don't need disk drives to function. This time next year we could well see a rash of MSDOS lap-held micros that combine the convenience of the NEC PC-8201A and the Tandy 100 with a measure of IBM compatibility.

At the same time, of course, a parallel wave of similarly-sized machines is likely to be rolling in from Japan, equipped with Microsoft's MSX. Of the candidates for the title of 'standard operating system' the company is strongly represented on home and business systems — MSDOS is ubiquitous in the business field and MSX is being spoken of as a possible standard for home micros despite the fact that so far it is restricted to Japanese micros. Microsoft aims to break this circle in the near future by announcing a European MSX micro manufacturer.

IBM PC into mini terminal

If your company has IBM minicomputers, and you are thinking about buying a micro, IBM has announced a product that will probably persuade you to buy its well-known PC.

It is a terminal emulation program with associated hardware, and it makes your PC look like an IBM terminal to the minicomputer.

The system works with System /34, /36 and /38 minis, and goes by the rather grand name of the IBM personal computer 5250 emulation program and display station adapter.

Hardware is designed to interface the PC (or XT) with the twinax cables used by normal IBM terminals, and costs $1434 including sales tax. The software allows a PC user to access all the functions normally available to a terminal user.

Monochrome and colour emulation is available, as appropriate on the PC, and a 'hot key' allows the user to switch between emulation and normal personal computing.

The host computer and the PC can exchange data files, and the PC can use the mainframe's mass storage, creating 'virtual' diskettes on it.

The PC must have certain minimum options including the PC-DOS operating system, a special emulation adaptor, 128k bytes of user memory, one disk drive (160 or 320k bytes), and the display adpator.

The price of hardware and software for this emulation system is considerably less than for a new IBM terminal — the actual price depends on the particular configuration chosen — and offers an interesting alternative to those wanting their own computing capability as well as access to the mainframe.

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Why is the drive capacity so important? Well for instance, it is usually most efficient to adjust your stock and debtors records as you write up your customer invoices That needs them all to be on in the drives at the same time. Then again with good sized disk storage your database can be a usable size, or you can store a really substantial amount of text from your word-processor as well as a good sized dictionary to check your spelling. Unless you have a midget business you are unlikely to be able to do this with less than 1,500 kilobytes of storage. The Executive 816 has nearly 1,600 kilobytes of storage built in to two slimline drives. As a comparison, the Model 3 or 4 TRS 80 have 384 kilobytes, the basic 2 drive IBM PC has 750 kilobytes. The 2 drive Apple 2e has a measly 286K storage.
So what does it all mean? Simply that even though it comes in a small portable package the 816 is one of the most powerful computers available on the market at anywhere near it's price bracket.
The second issue is the quality of the software. The 816 comes with an enhanced CP/M 2.2 operating system developed by Mark Henry of Compak Microcomputer Products. It is menu driven. You don't need to understand A> or PIP or Stat or any of the other built in CP/M commands. Just choose the option from the menu and the computer tells you what to do. Follow the yellow brick road. You can copy, format, look at the directory, run programmes, set up communications or even get into CP/M itself. The 816 can read 5" disks from the DEC Rainbow 100, IBM PC (CP/M 86), Kaypro, Cromemco, Osborne, HP 125, Morrow Micro Decision,. Televideo 802/803, Archives 2 and soon even more disk formats.

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OCAS is a system for keeping records of office costs and providing various reports regarding these costs. Costs can be either time related or fixed cost.
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Client accounts can be maintained, producing statements of any time and ageing reports to keep track of overdue accounts. With the 816's disk capacity, it is possible to keep 2000 entries in each of staff, tests, and transactions per month.

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Instead of being limited to primitive, labour intensive and slow management systems which are prone to error, you now can move into modern cost effective methods to handle on line telephone and over counter enquiries, as well as accounting and mailing, and has the flexibility to adapt to your needs while requiring less skill than a manual system.
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Membership records can be accessed by the alphanumeric code or by surname. With the 816's enormous disk capacity, one disk can hold, if needed, records for approx. 2,500 members!

PROJECT COSTING SYSTEM . . . . . FOR THE BUSINESSMAN
Need to track jobs as they move through your organisation?
No need to create a special programme as the ARM Data Base has been specially configured to cover the project costing.
As in the Database itself, everything is menu driven and there are no complex commands to learn; sample files are also provided for a "hands-on" demonstration.

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SUPERWRITER (including spelling checker)
The newest in Word Processing from the creators of the famous Super Calc programme, also incorporates a full on-screen help function, and an integrated dictionary of over 20,000 words, which customises itself to your vocabulary.
Form letters or mailing lists are also included in the package — no need for expensive extra programmes.
A Print Spooler is also on-line. Print while you type the next document. Above all, Super Writer is very easy to learn and use.

A DATABASE
From Australia comes the ARM Data-Base, with forms management. It is not just a file management system.
There are no complex commands, and the quality and sophistication of the data-base make the system easy to use; everything is menu driven and a demonstration data-base is supplied.

SUPERCALC
One of the best known and supported spread-sheet programmes is also supplied free with the 816.
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You have 64 columns and 256 rows to use.
Vary the width of individual columns at will; headings automatically extend across vacant cells; a help function is always available on screen; and of course, all the usual spread sheet functions.
Cash flow, budgets, and 'what if?' situations are a breeze using Super Calc. The only limitation is your own imagination, and we have several books on Super Calc to help you with ideas.

And finally the 816 comes complete with two utilities:

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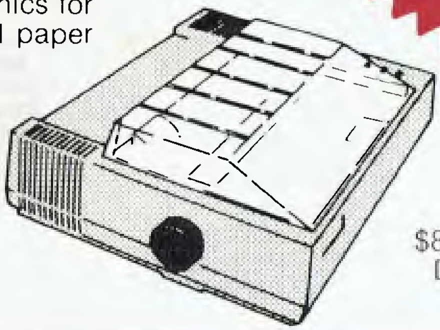

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TRIPLE ATTRACTION OF LOTUS 1—2—3

LOTUS 1—2—3 HAS CAUSED QUITE A STIR. MICHAEL FOREMAN REVIEWS THE PROGRAM THAT CUTS THREE WAYS AT ONCE

Lotus 1-2-3 is one of the most highly-rated micro-computer programs around at the moment. Since its launch in the US last April it has outsold every other program for the IBM Personal Computer. The key to its attraction is that it combines a spreadsheet with graphics and database management in one package.

These three facilities together mean that you can very quickly produce graphs and charts from figures on the spreadsheet like cash flow reports, or from a series of data held on the database.

We found that you could almost justify spending $900 on 1-2-3 for its excellent spreadsheet facilities alone, and the graphics functions are a welcome bonus. The weakest part of the program, however, is the database management system, which is limited when compared with the best specialised databases available.

That said, the presence of database facilities greatly widens the possible application of this program. Most spreadsheets are ideal for financial plans like cash flow reports and forecasts, and graphics makes the figures more readable. Adding a database means you can store a large amount of repetitive data, like a series of loans made to customers, or the performance of individuals in a sales force, and use the spreadsheet/graphics to draw overall conclusions and trends.

Getting Started

After all the fuss which is made of the fact that 1-2-3 is a fully integrated program it comes as a surprise to see that the package comes with five floppy disks. However all the main functions of the program are contained on a single 'System disk,' and Lotus has thoughtfully provided a back-up copy of this. The remaining three disks contain a tutorial program, a program called Printgraph, which as its name suggests, is used for printing 1-2-3 graphs and charts, and finally a utilities disk which includes programs to set up 1-2-3 to work with different monitors.

A rather cheeky item on the utilities disk translates spreadsheets which have been prepared on Visicalc (1-2-3's most important rival), so that they can be used with 1-2-3.

Lotus maintains that it always develops programs like 1-2-3 on exactly the same micro that it was intended for, and we found this approach had paid off as the program makes full use of the IBM's keyboard.

A plastic template is provided which sits on top of the IBM's plastic function keys to label each one according to what it has been programmed to do with 1-2-3, like Help, Graph and so on.

When you begin to run 1-2-3 you have a choice of two different ways to start it up. If you just want to run the 1-2-3 program itself then typing '123' gets you straight to it. A better way of doing it though is to use the 'Lotus Access Manager' giving you menu-driven control over all the other programs like the utilities and Printgraph associated with the main program, which you are bound to need at some stage.

If you have used other spreadsheet programs before, 1-2-3 looks a bit strange to start off with. At first glance the 1-2-3 screen looks worryingly blank. With programs like Multiplan all commands open to you are displayed at all times somewhere on the screen, unless you specify otherwise. All 1-2-3 shows you is a blank spreadsheet with rows across the page marked as numbers, and columns going down designated by letters.

We were not quite sure what to do at this stage so we pressed the 'Help' key for directions. The Help screen told us that we would have to press slash before entering any commands, when the usual menu would be displayed. In the course of the review we grew to like

this clear screen approach, as you were not distracted by illuminated squares trying to catch your attention when you were pondering on the next step, although instruction was always available through the now commonplace help command.

Large Matrix

Another very noticeable aspect of 1-2-3 is the enormous size of the spreadsheet working area which is available to you. 1-2-3's spreadsheets are so large that it takes several minutes to travel from top to bottom using the downward pointing arrow key. To compensate for the huge spreadsheet size of 2048 rows by 256 columns (Multiplan's dimensions are 255 rows by 64 columns), Lotus has introduced a couple of clever ways of moving around the spreadsheet very quickly.

Like most of the more recent spreadsheets, 1-2-3 allows you to skip to any part of the spreadsheet by typing in its row and column co-ordinates, or by a name which you have designated for a certain area like 'COSTS'.

But a very unusual feature is the ability to skip across the next gap in the figures that you have already entered onto the spreadsheet, in any direction. This is immensely useful as there are many occasions when you are building up a cash flow report for example, when you will need to take a look at a total at the bottom of a column, or across the page at the last month's entry for a certain figure. Skipping to the next blank cell gets you to these important areas very quickly.

Putting simple formulae in the spreadsheet, to define a certain co-ordinate as being the sum of several columns above it, for example, is easy. After typing in @SUM, followed by a first co-ordinate like B1, you simply press any of the arrow keys to move to another co-ordinate to show the range of figures that must be totalled. As you are doing this the figures you pass over are shown on a reverse background so you always know which range of figures you are specifying.

Fast Calculation

1-2-3 seems to perform calculations amazingly fast. We built up a fairly large budget report which would have taken a few seconds to be calculated on some spreadsheets, but 1-2-3 gave us the new totals when figures were changed without any noticeable delay.

Speed is an attraction throughout this package – something quite remarkable considering the program's scope. Graphics output, for example, is normally a very tedious business on financial modelling programs. Not only does 1-2-3 produce graphs and charts almost instantly but the method of setting them up is quick and easy too.

After pressing the function key labelled Graph, you select the type of graph or chart you want, from a range which includes line, bar, or pie charts. The next job is to select the range of figures you want to see plotted, which is achieved by using the arrow keys in the way described earlier. When you want to see the results you type V for View and the graph will appear so quickly that it almost seems as if it was already there waiting for you.

Once you have entered a range of figures, you can go back to Graph mode to change the type of presentation, from line to bar graph say, and a new image will be plotted almost as quickly. You can also plot more than one range of figures at once, to produce several lines on the same plot, or a stacked bar graph.

When you are quite satisfied with the rough appearance of the graph, it can be titled in a range of typefaces and printed on either the IBM dot matrix printer or a small range of other graphics printers or plotters using the Printgraph program.

Data Base

If 1-2-3 falls down at all it is in its database facilities. Although it contains sufficient database commands to be useful, the same row and column format used for spreadsheet work can be slightly inconvenient for handling repetitive data down the page. Column widths must be adjusted in advance to allow space for varying sized data items like names, addresses and salaries, and any calculations or results from that data must be stored somewhere else on the spreadsheet.

However, the presence of the database does not detract from the rest of the program at all, and it could prove its worth for small scale work. For example an investment company could keep a database containing the names of a few dozen shares, with the price paid and current market value. From time to time the current market value could be updated manually, and the database used to answer questions like the ten best or worst performers to date. Results of queries like this can either be highlighted with a reverse background, or copied somewhere else so that they can be graphed or used in a spreadsheet.

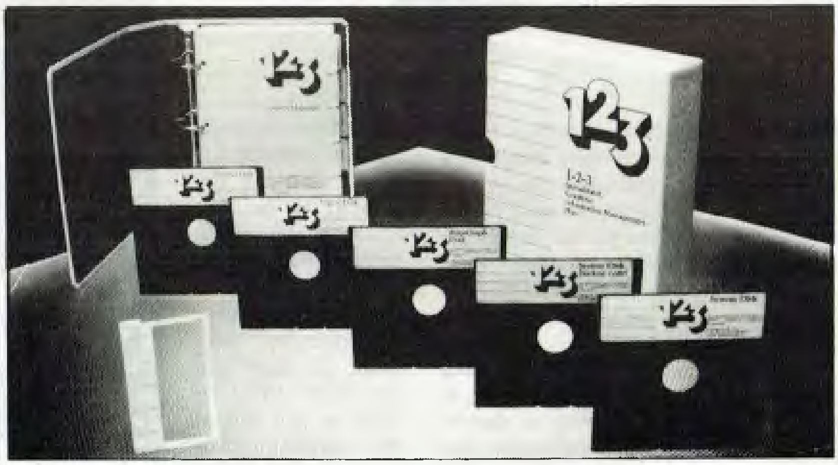
Lotus has certainly succeeded in integrating the three functions of this program extremely well, as data can be passed very easily between spreadsheet and database, and from both to the graphics functions.

As we were running 1-2-3 on an IBM XT with a 10 megabyte hard disk we had ample room to copy the contents of all the floppy disks onto the hard disk, which is very convenient as you never have to worry whether you have got the right disk in the drive. If you are running 1-2-3 on an ordinary IBM Personal Computer you will have to change disks to set the program up and to run the tutorial program, but the only time this will be necessary in subsequent use will be when you print graphs.

Lotus specifies that 1-2-3 needs at least 128 kbytes to run (192k on the IBM XT). Unfortunately our review IBM XT had only 128 kbytes, but the only part of 1-2-3 that was too large to fit into this amount of memory was the tutorial program – that was too big by a measly 4k or so.

Tutorial

Since everything else works perfectly in 128 kbytes it is tempting to forget about the tutorial program to save the price of an extra 64 kbytes of memory. Our advice is to instal the full 192 kbytes – the tutorial program is worth it.



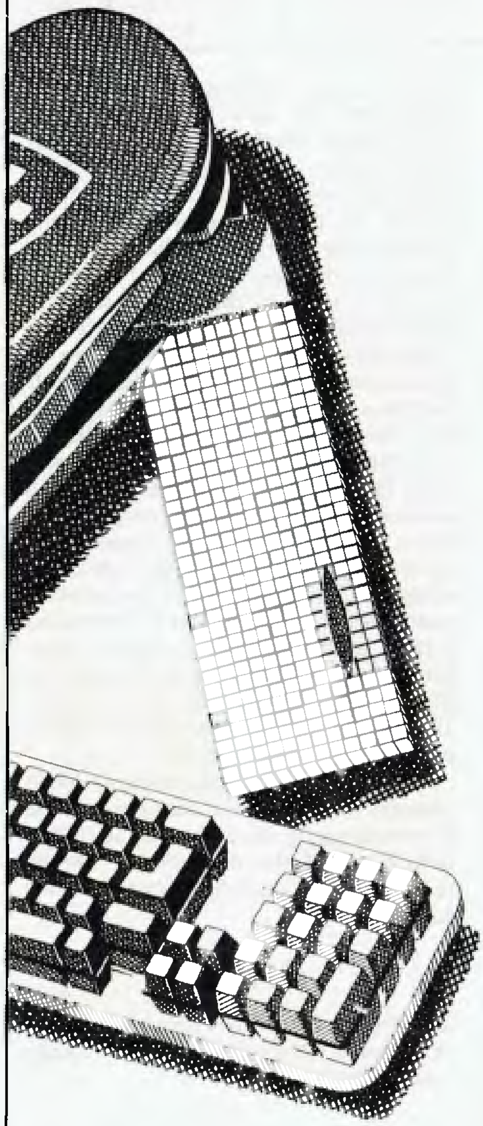
PRICE AND SOURCES

It is available for the IBM PC and IBM XT, Wang PC, Rainbow plus, Sirius and is about to be announced for the TI Professional.

Lotus 1-2-3 costs $895 which includes user manual, tutorial disk, system disks (five disks in all) and function key template.

It is available for the IBM PC and IBM XT, Wang PC, Rainbow plus, Sirius and is about to be announced for the TI professional.

Our advice is to instal the full 192 kbytes — the tutorial program is worth it.



Although 1-2-3's manual is clear and well presented throughout, there's an awful lot of it. The tutorial has six lessons which take you through the basic commands, with a finale which deals with the graphics facilities. At each stage you are prompted with the next command, which you can either enter yourself or press the space bar to make 1-2-3 accept the commands automatically. We reckon that a morning spent on this tutorial, followed up by an afternoon of trying things out while referring to the manual, would make most people competent enough to start using the program for a real-life project.

IBM dealers are beginning to use 1-2-3 as a way of showing businessmen who know little about computing the kind of things a micro could do for them, and by the end of this review we could understand why.

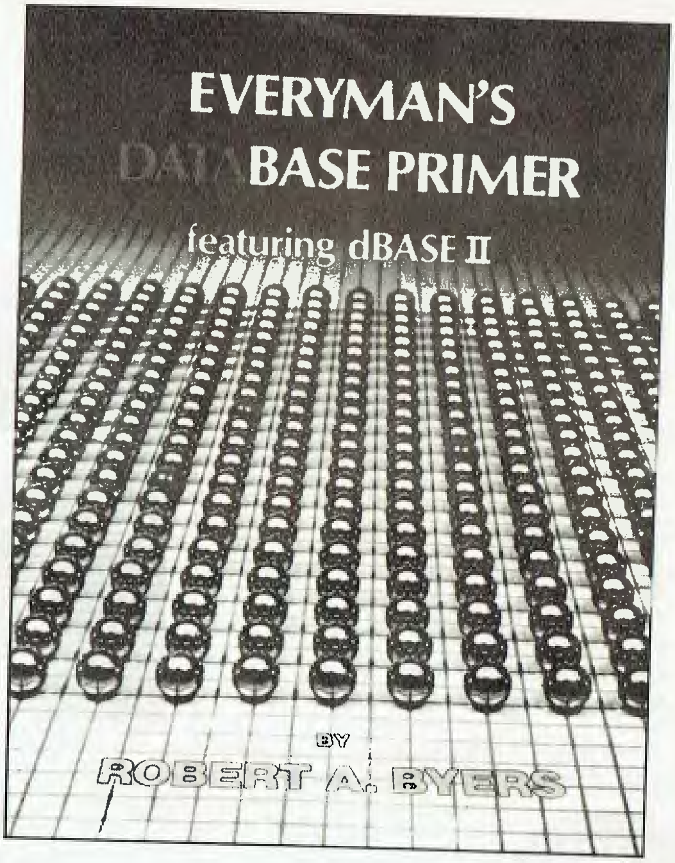
Conclusion

Lotus has pushed the highest standards of microcomputer software beyond previously accepted limits with 1-2-3, as it makes other once outstanding packages fade in comparison.

Sadly it is only the kind of programs which have international appeal across any business activity which are likely to reach this standard in the near future. 1-2-3 itself can only be a part answer to the need for versatile business software, as it would be unsuitable for a host of purposes, like integrated accounts. The best software houses tend to take the plums of possible applications, while leaving jobs which need close attention for the rest. As a result, the standards of most accounts programs are much lower even though they fulfil a more vital need for most businesses using micros.

1-2-3 is so pleasant to use it could act like a siren, distracting anyone buying an IBM PC from their original purpose. In this case it would be much better to forget what this program could do, and worry about what it could not do.

BOOKSHELF



The term 'database' is one of those bits of computer jargon which can sound rather intimidating to the uninitiated. In his book, Robert Byers tries to dispense some of the mystique surrounding databases and their uses. Because this is a practical book, it concentrates on one particular database program – dBase II.

The book assumes no previous knowledge of computers. Despite this, it sets off straight away with a simple application involving a small telephone list as an example. Everything that happens on the screen is illustrated, so that you can follow what's going on, even if you don't have access to the appropriate system.

The introduction of the various database terms, such as record, field names and field types, are all clear. The use of analogies to relate computer databases to more familiar concepts is helpful. A sound grounding in the basic terminology is very important, and is ensured by the use of clear, patient explanation and reviews later in the book to serve as reminders.

Things which are likely to be unfamiliar are explained in detail. Thus there is full coverage of the use of control keys for editing. Even those who have used a typewriter before will not necessarily have encountered control-keys.

Fortunately this attention to detail does not extend to unnecessary features which might only get in the way of the main exposition. CP/M is mentioned in passing, but not dwelt upon. The restriction of file names to eight characters is stressed, but without going into detail. There are chapters which cover the computer hardware and some technical terms associated with databases.

These chapters are well done and provide a clear treatment of the essential information, but they can safely be omitted if you just want to use a database.

One of the features of the book is the way the more advanced concepts, such as procedures and indexing, are mentioned some time before they are formally introduced. Not only does this give a better feel for how the whole package fits together, it also helps maintain interest by pointing to the attractions to come. This is helpful for those who are impatient to try out their own application, but feel restricted by the simple, but necessary introductory material. If they can see that there is light at the end of the tunnel, they are more likely to stick at it and gain the basic information, rather than rush into the advanced material and make a botch of it. An important aspect of data base management which received some well-deserved attention is that of data entry and error trapping. Computers may seem to be all-knowing and infallible (to some people, at least – we know better, of course), but they are only as good as the data fed into them. The very survival of the business can depend on the accurate storage of information. It's therefore a good idea to ensure that entry is easy, and that as many errors as possible are caught before they are buried deep in the system where they lurk quietly until it's too late.

DUMBFOUNDED BY DATABASES? THE EVERYMAN'S DATABASE PRIMER, WHICH EXPLAINS THEM IN LAY TERMS, COULD BE FOR YOU.

A closely related security consideration which is not given as much prominence as perhaps it should be, is the need to make frequent backups. When it can take just seconds to destroy many hours of work and much irreplacable information, it is absolutely vital that backups are made regularly and often.

A great deal can be accomplished with a good database management system without ever having to do any programming. The full power of such a system is only realised when command procedures are used to perform more complicated manipulations. This may seem rather a daunting prospect to someone who has never programmed before, so the author introduces procedures very gently with the simplest of four line routines, which just saves the user from some of the typing needed to interrogate a cheque-book database.

Having displayed the advantages of procedures for saving time and possible irritation, the next stage is to introduce the idea of loops and conditional execution (the 'IF' statement), and build these into larger constructs. A full example is given (the obligatory cheque-book balancer), and the stages in its development are carefully explained while at the same time introducing many new commands. One convenient feature is that a table of control codes for use in editing is repeated a number of times, near to where it is needed. This may not save trees, but it certainly makes the book easy to use.

There is a fairly full glossary, which contains both technical terms and dBase II commands. It does not include formal definitions of the commands – something which is lacking throughout the book.

Price

Everyman's Database Primer, by Robert A. Byers, (Prentice/Hall), 295 pages, price $26.95.

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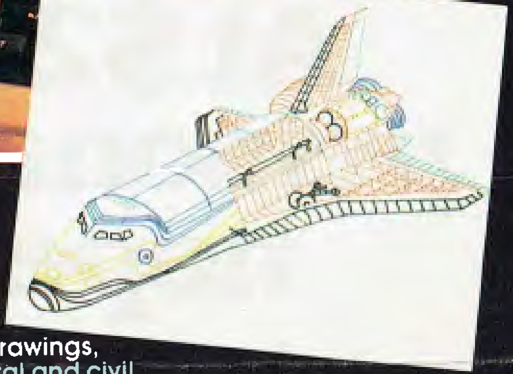

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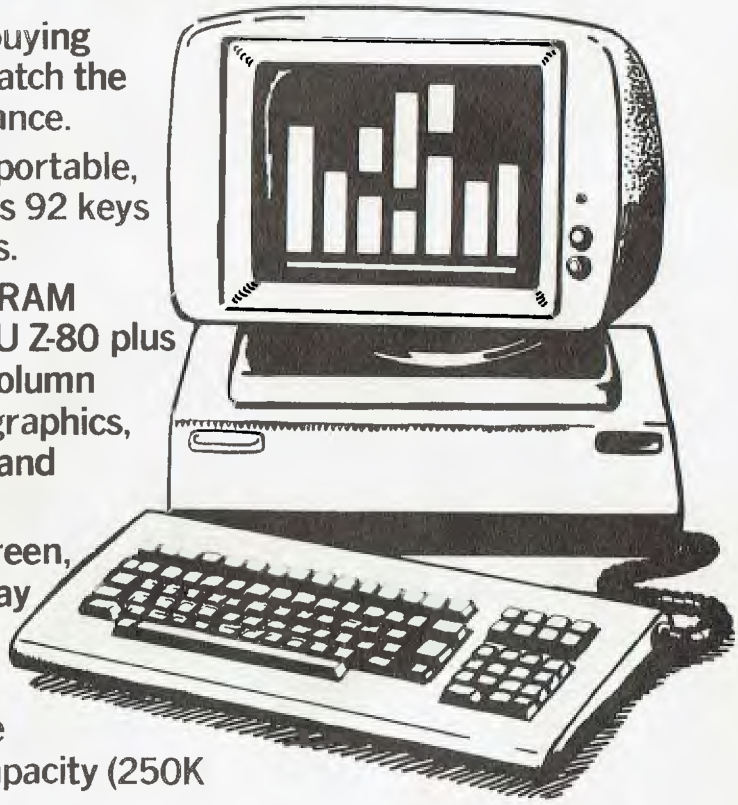

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PANIC BUYING SPARKS US MICRO BOOM

FROM OUR MAN IN THE US, CHRIS ROWLEY

'Tis Christmas at last and a hush has fallen across the rather stunned American retail landscape. Americans came back to Christmas this year with a roar of wallet zippers and credit cards clacking across counter tops. Never had so much been spent so fast, the figures evoked comparison to the US defence budget! At the heart of the boom was the gift of the season, the micro. By some estimates as many as 2 to 2.5 million micros have just been purchased. Every model has been selling heavily. In fact there were strange scenes. The distress sale price of $50 for a TI99/4A turned the machine into a 'stocking stuffer' and provoked near riots like the battle at the Greensboro North Carolina K-Mart, where hundreds of shoppers stormed the door and fought for the machines on display. The store had to be closed while the computer crazed Carolinans were dispersed by police and state troopers.

But every available machine was selling. The consensus of analysts was that Coleco missed out on a huge number of sales by failing to get more then 150,000 machines into the shops. Equally agonising for Atari were production cutbacks in the summer of red ink, leaving shortages of everything. I doubt seriously that there is an unsold Atari XL anywhere in the New York region.

Who really did well? Yep, that's right, over at Commodore they were so busy refilling Santa's sleigh that nobody could come to the phone, but it is believed that as many as 500,000 64s and Vic 20s have been sold in the past few weeks.

One result of all this is that as much as 15 per cent of Coleco's entire stock is now in a short position, with investors borrowing shares to sell at today's price in anticipation of buying much cheaper shares really soon when prices fall dramatically. Of course, Coleco does have $25 million rolling in from the Cabbage Patch with which to keep the banks at bay for a while, and just possibly sales of Adam will keep building through January to confound the speculators.

Right on cue, in the midst of the biggest microsale boom yet seen, came the Comdex extravaganza in Las Vegas. In four short years Comdex has ballooned into the biggest vein in US trade shows. Certainly it strains Las Vegas' capabilities as host city to the limits. This year 83,000 visitors trudged the 11 miles of aisles to gaze upon the 1,400 exhibits (550 new to the show) which had around $100 million worth of equipment on display. But while they babbled new buzz words, bewildered visitors battled in the bizarre conditions which meant 50 minutes' wait for cabs, for restaurant tables, even for phones. It was worse than Disneyworld on July 4 weekend and much more expensive per head. Along the aisles Elvis Presely and Marilyn Monroe clones meet the crowd along with hustlers of every shape and hue. There wasn't a hotel room to be found within 100 miles and the take for Las Vegas itself was in the region of $150 million.

Now that Comdex has become such a colossus clear trends could not be discerned except for a vast proliferation of software offerings. Possibly next year's show will be a little smaller once the 'Great Software Shakeout' has taken place. There are now enough accounting and tax preparation packages to stretch from here to the Salyut space station if not to the moon.

The quote of the show came from its organiser, Sheldon Adelson of Interface Group (said to have netted $13 million from this year's show)...'If there's a trend at the show it's the selling of total solutions to the computer illiterate business community.'

The Comdex daily newspaper (200 pages) even spawned a spoof aptly christened 'Confuserworld — sample headline 'IBM calls it quits — just no fun anymore...'

Hardware News:— run CP/M software on your Commodore 64 with the Convert 80 Interface card ($350) and 5¼in disk drive ($500) from Estes Engineering of Kansas. This means a CP/M Commodore 64 system with two drives, colour monitor and printer can be assembled for about $2,200.

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BASIC EPROM UTILITY

Includes Lower case driver, Key debounce, APC80 Commands, Protect, Cancel Protect and Restore Basic Program, Line Renumberer, Basic Program load, Screen editor, Screen print, Set memory size, Select cursor value, Line move and line check. Shift lock, Key repeat, Single keyword entry which can be toggled on or off.

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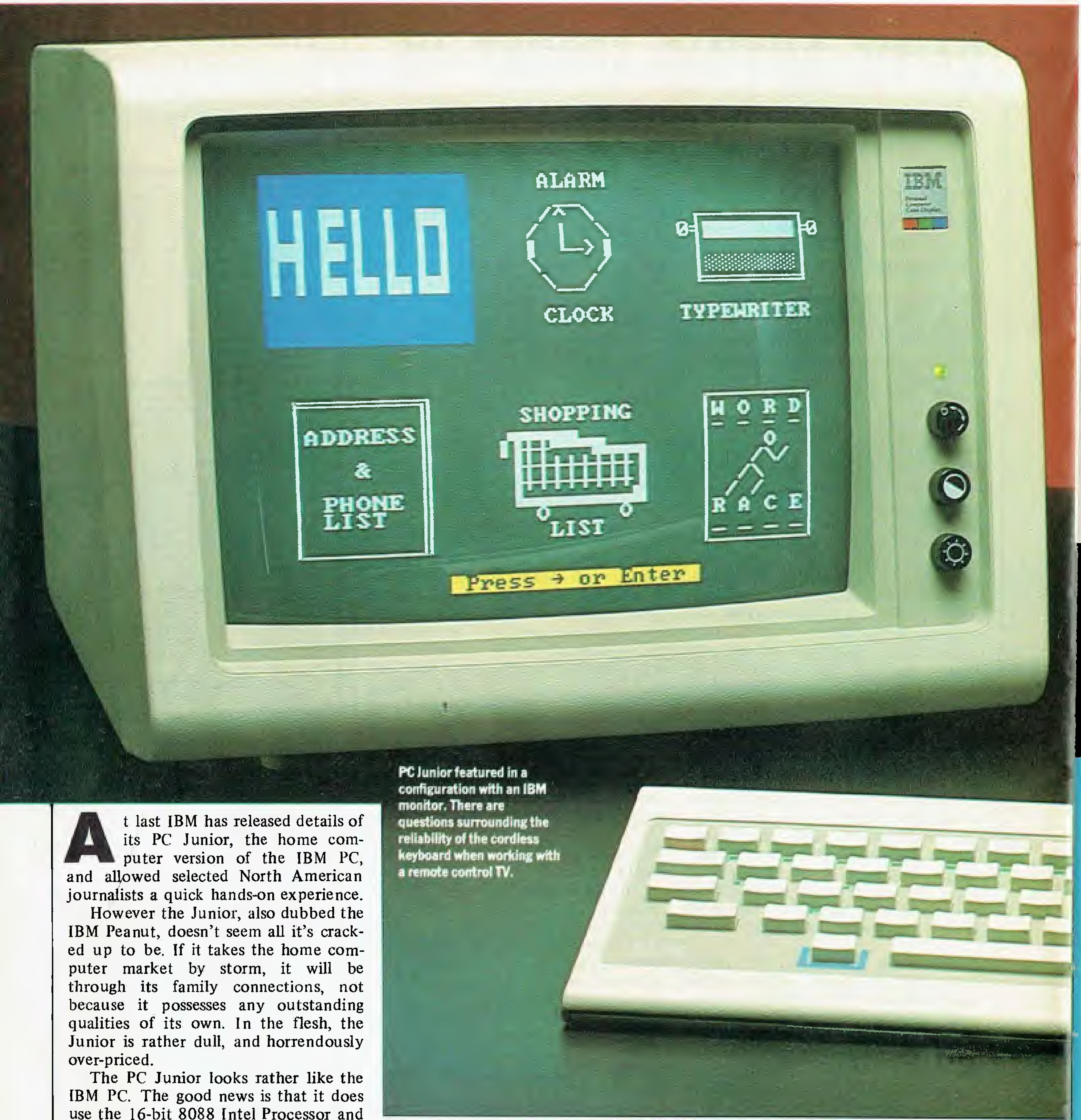

PC Junior featured in a configuration with an IBM monitor. There are questions surrounding the reliability of the cordless keyboard when working with a remote control TV.

At last IBM has released details of its PC Junior, the home computer version of the IBM PC, and allowed selected North American journalists a quick hands-on experience.

However the Junior, also dubbed the IBM Peanut, doesn't seem all it's cracked up to be. If it takes the home computer market by storm, it will be through its family connections, not because it possesses any outstanding qualities of its own. In the flesh, the Junior is rather dull, and horrendously over-priced.

The PC Junior looks rather like the IBM PC. The good news is that it does use the 16-bit 8088 Intel Processor and it does run the PC's operating system, PC-DOS although it is a revamped version called 2.1. The operating system comes 'bundled' with the machine. In the US it can also be bought as an extra for the IBM PC so that machine can run the Junior's applications programs.

Some of the bad news involves the Junior's keyboard which has been described as 'rather inadequate' by our North American correspondent. It is laid out a bit like the PC's except that it lacks the IBM's 10 special function keys. By way of recompense, IBM has colour-coded the remaining 62 keys so special functions can be performed through a 'shift' operation.

The keys themselves are rubber domed arrangements rather then full-moving. This seems anomolous as it rules out effective word-processing (always a feature noticed by journalists, perhaps). But IBM does expect this to be a popular application and has already

Peanut power

announced its Home Word package for the machine.

The costs, presumably cut by downgrading the keyboard, have been reintroduced in the form of an infra-red remote control system (the same technology that magically changes the channels on a TV remote control unit).

The keyboard can be used up to 20 feet away 'in line of sight' without a connecting cable. The system uses batteries to achieve the effect and turns itself off when the keys aren't being pressed. The batteries are supposed to last up to three months.

There are a few question-marks surrounding the reliability of the remote keyboard when competing with home-appliances on the same frequency. The fact that IBM also offers a conventional cable arrangement (costing US$20) should tell us something, though it's always possible that users will want to manipulate the keyboard 'out of sight' of the receiver. Then again IBM expects that many of the Juniors will end up in classrooms where their IR signals would clash – cables here would be a necessity.

None of this explains why IBM bothered with the infra-red keyboard at all – we think it's an obvious gimmick but judge for yourselves.

There's more bad news surrounding upgradability. IBM naturally doesn't want the Junior to take sales away from the PC. This is a possibility if a clear upgrade path, (free of expensive obstructions) is opened up to the potential purchaser.

The Entry Model has 64k and runs cartridge software. It can display forty characters across a line and has variety of screen modes. 160x200 pixels are available in 16 colours, 320 by 200 in 4 colour mode and 640x200 in two colours.

The Expanded model comes with one 360k disk drive and 128k. Users can upgrade from Entry to Expanded – a 64k RAM cartridge and 80 column display costs $140 and the disk drive costs $480. If you really want to you can apparently expand the Junior to 640k of RAM though the dollars might all tot up to send shudders down the spine.

Monitors, of course, are an additional expense. Users of the Entry Model will obviously use a TV set to display their 40 columns of text, but the Expanded model can utilise IBM's colour monitor.

IBM has the software base off the ground already. There is a special Basic language. PCJr Basic, a Home Budget program, a Personal Communications Manager, the Home Word package, a range of games and a 'sampler' disk for the extended model which shows the users how to make the most of the system. An additional 'exploring' diskette shows them how the system works.

IBM has other options as well. In the US there is to be a 300-baud hardwired modem with auto-dial and auto-answer, costing $199, plus a $175 50cps thermal printer with a $40 adaptor.

The PC Junior is not expected to appear in this country for some time yet. The IBM PC took over a year to cross the Pacific and although IBM always plays its cards very close to its chest, the odds are that the Junior will also take a leisurely passage.

The important things is that the machine has finally surfaced. If you are wondering whether it was worth the wait the answer could well be no, but the PC Junior is an important machine simply because it has the initials of the world's largest computer company stamped on it.

The rumours that IBM was about to launch a home computer made the other US home computer manufacturers quake in their boots. Since the release of IBM's PC, the business/personal microcomputer market in the US has been transformed and many experts expected the same process to occur with the Peanut.

The PC has become the 16-bit micro standard there, and a host of IBM compatibles from both the US and Japan have sprung up to collect IBM's crumbs – some of the crumbs have been rather substantial, especially in the portable or luggable market. At the upper end of the micro market, if it's not IBM-compatible, it's at a very severe disadvantage.

The IBM thermal printer does seem to be priced reasonably at $175. It's capable of a respectable 50 cps. Likewise the $199 modem seems reasonable as it has auto–answer as standard features. The keyboard however is a disappointment being more calculator–like than full–moving.

By only releasing selected details of the Junior, IBM managed to ruin its competitors' Christmases. The stock exchange was already jittery about the future of the micro industry in the wake of Osborne's difficulties. Texas Instruments pulling out of the home micro market and losses reported by Atari, to name just a few reversals.

When IBM spent months being mysterious over a new release, investors wisely remained wary of investing in any of its competitors. According to some US spokesmen, Christmas buyers were also put off buying alternatives by IBM's decision not to start making the Jr available until early this year.

As far as users in Australia are concerned, the IBM PCJr is bound to have some sort of impact. If things go the usual IBM way, the Junior and its compatibles will arrive on these shores eventually. The Jr will become standard that can't be ignored by users simply because the software and expansion facilities will be huge. The pity is, the Peanut will be at least 40 per cent more expensive than it need be to prevent it from competing with the fully-blown PC. Once Peanut owners reach the end of the Peanut's potential they will have to buy a new product to get any further – 'bait and switch' is the industry jargon for this marketing technique.

Such is IBM's status and power that it can actually afford to see the market in these terms. The possibility that users might opt for neither the PC nor the Jr doesn't seem to figure in the strategy. The annoying thing is that IBM is probably right.

Even if the Peanut is a lemon and does get a raspberry, the familiar scene seems set to unfold again. The overpriced Peanut will sell in huge quantities. Dozens of US software and 'third party' add-on manufacturers will produce supporting products. This trend will be encouraged as Peanut-compatibles arrive on the scene. IBM will sell even more Peanuts . . . and so it goes on.

If, by some miracle, this doesn't happen, IBM will hardly notice the difference – to IBM, home computers *are* Peanuts.

If the Junior fails to sell, IBM will simply lick its slight scratch . . . and come back with something better.

For example the company recently decided that a $100 million-plus research program into advanced, high-speed processors was a blind alley. It simply announced that it wasn't interested anymore, wrote off 15 years development effort and reassigned over 100 scientists – Peanuts indeed!

SPECIFICATION

Price	(US dollars) Entry model with cartridge port and 64k $669 Expanded model with 128k and 360k disk drive $1269, entry can be Expanded for $260.
Processor	Intel 8088 16-bit
RAM	Entry 64k. Expanded 128k.
Graphics screen	160 by 200 pixels in 16 colours. 320 by 200 in four colours. 640 by 200 in two colours.
Keyboard	62 keys
Storage	Entry, cartridge. Expanded 360k 5.25 inch floppy disk drive, cassette interface.
Interfaces	Joystick ports, light pen socket, parallel interface, serial interface.
Operating System	PC-DOS 2.1
Distributor	IBM

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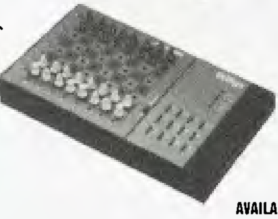

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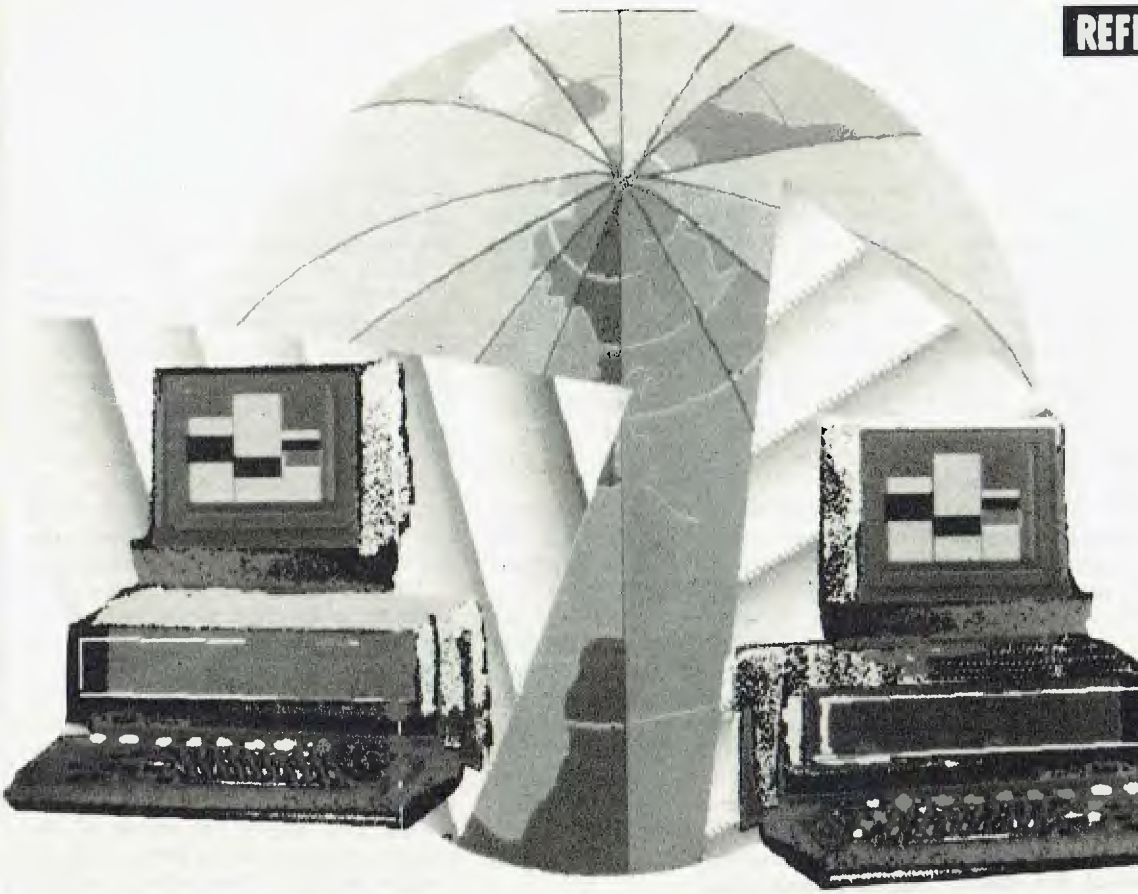


GET FLEXIBLE WITH REFLEXION

IS REFLEXIVE VISICALC, WHICH ALLOWS DATA TRANSFER BETWEEN TWO DISTANT MICROS AND A WHOLE LOT MORE), SET TO TAKE SPREADSHEETING INTO A WHOLE NEW DIMENSION?

A growing legion of micro owners is buying modems to link their computers with larger systems, information networks, and other users. Now a Canadian programmer has developed an operating system that allows direct connection between microcomputers for truly interactive uses. Allowing much more than just transfer of data or program files, this new system lets you hook up your computer with a similar computer and engage in a new style of co-operative or reflexive processing, and at a cost of $100 its very affordable!

Reflexive processing involves two or more separate computers that run identical programs with identical data at the same time. With the computers connected via a telephone hookup, the Reflexive program exchanges keystroke commands so the two systems are always in synchronisation. Whatever you do on your computer automatically occurs a fraction of a second later on every other computer in the hookup. Each computer 'reflects' the operations performed on any of the others, hence the name 'reflexive'.

Reflexive VisiCalc (RVC), the first applications program to use this new process, allows co-operative processing of VisiCalc models on separate computers. You connect two or more computers over telephone lines and load RVC into each computer's memory. Then you load VisiCalc into each system with identical models or templates. Once connected, each computer 'reflects' all the keystrokes and thus all the recalculations, reformatting, and revising of the model done on any of the others.

For example, you could connect a computer in Sydney to an opposite number in Toronto, and set up both computers to run VisiCalc and display the same model of, say a potential property acquisition. Whenever the model is modified to show the purchase price; loan interest rate, the screen in the Toronto office also displays the resulting changes. When the Toronto Manager makes a change in the model on his computer, my screen immediately reflects his modifications.

In one application of RVC, two Personnel Managers, thousands of miles apart, were able to discuss salary increases for their employees and see the effects on Cash Flow via VisiCalc. With RVC and a separate telephone link for conversations, they first built a simple model to hold data about each employee, totalled the separate increases and compared this total to the allowable minimum. Either executive could then modify the model, and both executives could see the results of the recalculation instantly.

The tasks you could use RVC for are very wide ranging: in accounting, Reflexive budgeting saves time by enabling people at various locations of a single company to jointly enter and consolidate data. This is particularly useful in situations where many different offices must get all their figures to agree. It minimizes delays and eliminates travelling time; in product planning, various experts at different locations can manipulate copies of a single model. The co-operative result will incorporate their collective ideas and knowledge and be more accurate than the efforts of one individual; in negotiations, several people can simultaneously control one VisiCalc model from their separate offices. They can demonstrate on the screen the various constants, formulae, time periods, and relationships that effect the negotiations.

To ensure privacy, one segments the model so some columns – say, A through Z – are reserved for shared information, while other columns – say AA through AZ – are reserved for confidential information. Only the shared data would be loaded on all the linked computers; the private data would be loaded in from a separate disk file after the link is established. Because the computers transmit only keystrokes but no data, no one can glimpse someone else's private information or disturb it in any way.

Much of VisiCalc's value stems from the way it helps you capture fleeting ideas and combine simple relationships into complex, interactive financial models. However, only one person at a time can work with a standard VisiCalc model as it develops. With Reflexive VisiCalc, several people can participate directly in developing a financial model. This is somewhat like having a personal computer with more than one keyboard.

Reflexive programming is based on a fairly simple idea: the patch code that makes a program reflexive is interposed between the keyboard, the modem, and the particular applications program. The Reflexive code accepts the keystrokes, which are then passed to both the modem and the applications program. The Reflexive patch on the receiving computer receives the signals from the modem, and passes them to the applications program just as though they originated on the keyboard.

RVC offers nearly instantaneous response even when it's dealing with a massive data file. Nearly all the delay comes from VisiCalc's recalculations rather than from delays in transmitting data. When you have two computers operating reflexively in the same room, one screen follows just a half second behind the other. To use RVC, you follow a four-stage procedure:

Establish a modem connection between two or more computers.

Boot the RVC disk on all the computers.

Boot VisiCalc on all the computers.

Load the same VisiCalc data file from data disks on all the computers.

Once you have done all this, any keystroke on any of the linked computers automatically controls the VisiCalc models on all the computers.

We have deliberately postponed discussing one major requirement for operating programs reflexively: you must provide all the computers in the hookup with identical data files – whether VisiCalc models or word-processor documents – at the beginning of the reflexive run.

The solution is DOS File Exchange (DFX), a file-exchange program for the Apple II from the author of Reflexive VisiCalc. DFX has a few special features that distinguish it from other file-transfer programs for personal computers.

First, the receiving computer does not initially require a copy of the transfer program because DFX can take over control of a remote computer previously set to receive a telephone call. It can initialize a disk at the remote location, then send a secondary copy of itself to be saved on that disk. A secondary copy of DFX is just as good as the original, except that two secondary copies cannot exchange files directly. Actual file exchange requires at least one primary or original disk.

Second, DFX lets you queue the files you want to send. Most other file-transfer programs operate on one file at a time: you designate a file, watch it transfer, then designate another file, and so on. You can designate any number of files on a single disk for transfer.

Third, DFX lets people at the two computer sites carry on a real time conversation at the same time that they are transferring files. This 'chat mode' makes it possible for operators to comment on the files being transferred or discuss something entirely unrelated without disturbing the accuracy or the rate of the data transmission. In addition, DFX is a straightforward and efficient file-exchange program. It requires an Apple II with one disk drive and the Hayes Micromodem II.

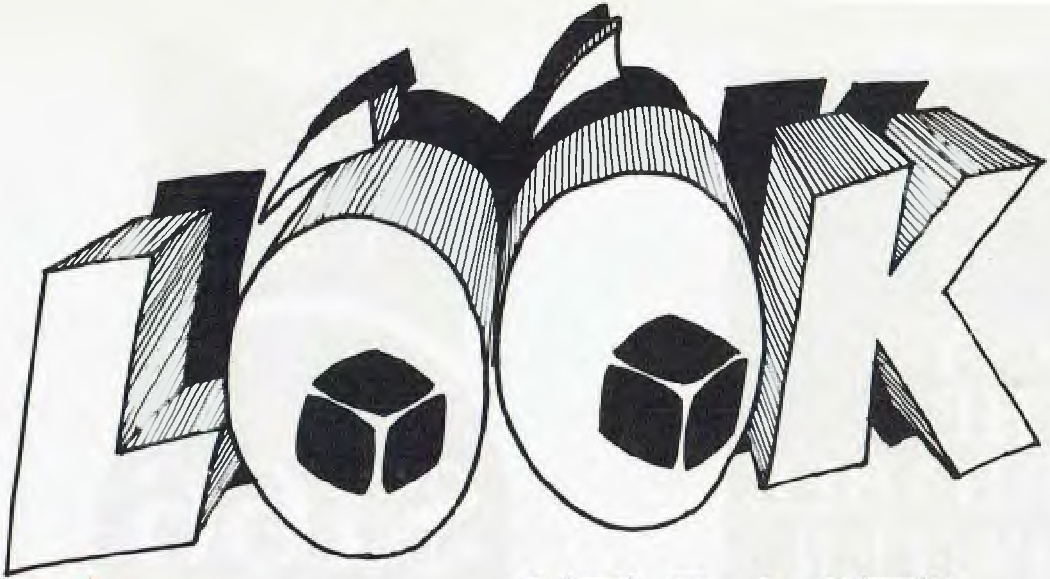
DFX's menus make operation quite easy. You choose from two main menus, depending on whether or not your modem detects a carrier signal on the line. With no carrier signal present, DFX reverts to its 'Waiting for call' state, and lets you originate a call or boot another program. With a carrier signal present, it lets you gain master control of the file exchange, hang up the line, or boot another program without losing your telephone connection.

DFX operates either in the chat mode or in function mode. In order to start transferring files, you switch to the function mode by hitting the forward arrow key. You use the chat mode for exchanging messages in real time while files are being transferred. Each computer displays its own mode at the right of a status line at the bottom of the screen, and shows the mode of the remote computer at the bottom left. As long as one of the computers is running a primary version of DFX, either computer can control the transfer. The computer with master control displays a menu with options to send local files, receive remote files, or exit the master mode; when the master computer prints the catalog of a disk either end of the connection, both computers display the catalog.

The operator of the master computer can then select any or all of the files for transfer by moving a selection cursor over the directory listings and pressing the selection indicator. When ready, hitting CTRL-C on the master computer's keyboard initiates file transfer.

DFX also provides two ways to view the data being transferred. Hitting the ESC key switches between the current menu, a utility screen, and a graphics screen on which you can watch a picture build up as it comes over your telephone line. The utility screen shows you the incoming and outgoing data, and contains a movable pointer that lets you examine the hexadecimal value of characters one at a time. The utility screen also includes a count of the total number of characters sent and received in the file. The status line shows your own screen selection at the right and the screen selection at the remote computer on the left.

DFX provides minimal error correction: the program ckecksums each block of 256 characters, a process that compares the sums of all the characters



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transmitted. If any discrepancy is detected, it automatically retransmits the block.

While DFX is generally quite effective, it also has its limitations. It can handle only 38 files in a directory, even though the disk can hold up to 105 different files. It works only with the Microdem II, or CAT Novation which must be located in slot 2. Most important, because DFX is a one-disk drive program, its automatic operation is limited to the files contained on a single disk.

However, DFX is a perfect companion to reflexive operations. Although it cannot transmit a primary copy of RVC required for VisiCalc operation, you can use it to establish the phone connection and send the other person the data file on which you want to work reflexively.

The tasks which you could use Reflexive VisiCalc for are very wide ranging: it minimizes time delays and eliminates travellling time; in product planning, various experts at different locations can manipulate copies of a single model.

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Reflexive VisiCalc, together with DOS Exchange (DFX), (5¼ inch floppy disk; two identical master disks provided) comes with a 30 page A4 Manual, containing Super Graphic Demonstration programs on the disk.

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AUSTRALIAN BUSINESS COMPUTER

SPECIAL

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BUYING YOUR FIRST BUSINESS MICRO

Earlier issues of *ABC* have addressed the problems faced by people who wish to introduce computers to their working life. For example, the very first issue contained a section devoted to computers for medical practitioners. This month we aim to cover the issues that are common to the majority of people who are considering buying their first micro for business applications.

Of course, the simple phrase "business applications" means different things to different people. If you are a manager, your interest might be in spreadsheet and project planning programs. An accountant might be looking for a fully integrated, all-singing, all-dancing system to replace the existing ledgers. A secretary could be looking into word processing and appointment scheduling systems. What is it that *you* are trying to achieve?

If you approach a salesman without doing your homework first, you may be inviting trouble. If you haven't thought carefully about what you want to do there is a risk that you will be influenced by a "gee-whiz" demonstration instead of finding answers to important questions. After all, would you walk into the nearest car yard without thinking about the type (not necessarily the model) you need and without checking the dealer's reputation?

On the other hand, most salesmen and women recognise what we may call a sophisticated buyer — not necessarily someone who is a computer expert, but a person who has clear goals in mind, who won't tolerate being blinded by jargon, and who expects to be treated like an intelligent, responsible adult.

A word of warning: the following articles can only provide general advice, so you should consult your accountant, tax advisor, or other appropriate professionals about the implications for your business in such areas as audit requirements and tax implications.

These articles should give readers a framework in which they can plan a course of action. Which aspects of the organisation's activities are amenable to computerisation? What should be included in the budget? How can one identify a good dealer? These are some of the questions posed by our authors.

If you are hungry for more information after reading this special section, *ABC* has already featured several articles of interest to the first-time buyer. Our series on "The Systems Approach" (Vol 1, Nos 2-4) provides extended coverage of the steps involved in setting up a business system. For a discussion on the use (and misuse) of consultants, see "Who Needs a Consultant" by Kate Behan (Vol 1, No 1, p71), and "The Consultant's Role" by Barry Ferranti (Vol 1, No 2, p29). David Uren examined some of the financial aspects of acquiring a computer in "Looking at Finance" (Vol 1, No 1, p86), and Michael Gresvero relates an interesting anecdote in "Two Golden Rules for Micro Buyers" (Vol 2, No 3). If you want to read up on some of the jargon you may encounter, refer to "Hardware — Software" elsewhere in this issue.

N BUSINESS

UTER

DOES YOUR BUSINESS NEED A COMPUTER?

Use Martin Ebb's questions to find the answer to the most important question of them all

WILL A COMPUTER SAVE YOU MONEY?

William Horwood explains why you should look further than dollars and cents when you think about micros

HOW CAN YOU FIND THE BEST SOFTWARE?

Fiona Newman provides some pointers to help you choose

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A handy guide to some of the best selling software

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Operating systems explained

SHOULD YOU GO TO AN AUTHORISED DEALER?

Fiona Newman finds out how much — or how little — a manufacturer's seal of approval can mean

HOW SHOULD YOU TALK TO A COMPUTER SALESMAN?

Use Fiona Newman's questions to get the information you need

HOW TO KEEP TRACK OF THE EXTRAS

William Horwood tots up all the bits and pieces that can add to the cost of a computer

JUGGLE AND WIN

MARTIN EBBS OUTLINES THE QUESTIONS YOU SHOULD BE ABLE TO ANSWER BEFORE YOU INTRODUCE A MICRO INTO A BUSINESS -

When it comes to buying their first micro-computer, it's surprising how many people try to run before they learn how to walk. Many of the problems that people encounter with micros arise because they've not taken the time to find out what their business actually does before rushing off to their nearest computer dealer.

In fact, choosing which micro to buy is the easiest part of computerising. Once you have ploughed through the books and magazines on the subject, you can always find dealers ready and willing to display the merits of rival systems.

But to make an intelligent choice based on all of this information, you have got to know just which parts of your business you are trying to computerise.

And only you, or someone else at your company, can fully understand the range of problems and needs peculiar to your business.

Only by reviewing your business systematically with a view to the things that micros can do, can you decide where to start your first system and then develop its use to the full potential within your operation.

This requires a certain amount of homework on your part. Before you take any steps towards buying a microcomputer, you will have to:

- develop a general appreciation of what microcomputers can do for business
- review your business and its objectives
- relate what microcomputers can achieve to those objectives
- come up with an overall information systems plan.

Micros in business

Micros can be used for a variety of business applications including accounting word processing, financial analysis and modelling, file systems and databases, business graphics and even systems tailored to specific industries.

Such systems generally benefit companies by improving their productivity by reducing costs or improving the performance of a business without using any extra resources.

Among the benefits that micros can bring are more cost effective methods of performing mundane and repetitive tasks, improving analysis and decision making by allowing better classification, identification or compilation of information and improving communication either within the company or to your customers.

Not all these benefits will come the day you plug in your system, of course. In fact, part of your planning should involve deciding which benefits are most important to you and so should come first in the overall implementation plan.

Reviewing your business

But none of this will come about unless you take a long hard look at your business. You can best do this by asking – and answering – a number of strategic and commercial questions, as well as some having to do with the way that your company operates and is organised.

Strategic and commercial questions

1. How competitive is your business?
Do you provide, and present, information on your products or services? Should you be spending more time on market research, or spending more time with your existing or potential customers? Could you improve customer service through better stock maintenance, quicker order processing and delivery? What sort of improvements are your competitors making?

2. How is your business likely to grow or develop?
How is your business likely to change? Estimate the future number of customers, suppliers, types and nature of stock item, locations of the business and transactions per month. The way the nature, size or variety of customers, products and services may develop must also be taken into account.

Operational questions:

1. What should you be doing more of to improve business results?
Should you be concentrating on more business development effort, developing products and services, solving operational problems or more general decision making?

2. What prevents you from spending more time on those activities?
Are difficulties due to problems in getting hold of information, communication difficulties, or being bogged down by excessive administration and complex analyses?

3. What are the most serious problems of your business?
Do you lose customers through stock outs? Cash shortages arising from overstocking or too many overdue accounts could cripple the business – do you have adequate control over these? Administration may be too costly or take time away from money-making activities.

4. What difficulties do you have in analysing the business?
Can you adequately plan ahead and evaluate alternative options? How complicated is it to analyse the source of types and sizes of sales for operational or marketing planning purposes? Can you get up-to-date information on stock and cash levels and identify what you may have to do to rectify immediate problems?

5. How well is the system run manually?
Improvements in some manual systems could obviate the need for a computer. However, if you have decided to computerise a manual system, it may need to be tightened up in preparation for automation.

Organisational questions:

1. What type of workers do you employ and how is their time spent?
It is helpful to review how many of each type of worker is engaged in running the business – professional, managerial, 'knowledge workers', administrative, clerical, secretarial. All spend some of their time in producing documents, recording, getting information, analysing it, communication internally or externally. Waiting for work consumes time too.

2. How should this time be spent?
Could these activities be speeded up by automation and by devoting more of the time of each worker to the activities they specialise in?

3. Who will be in overall charge of implementing new systems?
Involving the people concerned is a good way of analysing these organisational questions. One person, however, needs to be put in overall charge of researching and introduction of new systems. Central co-ordination is required to clarify objectives, define priorities and to supervise specification, selection and introduction to ensure harmonisation of the systems introduced.

Once you have answered these questions you should be ready to try to match up what you hope to do, with what microcomputers can actually accomplish.

Micros are very good at saving time on repetitive work such as sending out letters or invoices, so they can be used to reduce the time and money spent on administration. They can also, with the help of accounting and financial planning systems, help you to get information more quickly and therefore speed up decisions. For more of the benefits that microcomputers can bring see table above.

Once you have worked out what you want to do and what micros can do, you should be able to come up with a plan for putting micros to work in your business. You should bear in mind that you won't be able to do everything at once. In fact, your plan should involve a number of stages.

Make a system plan

You must decide how you want to begin, what you will want to do as a second phase and how you intend to develop after that. If you do this you should guard against outgrowing your system too quickly or having difficulty adding new software, to the packages that you started out with:

To do this you must evaluate the pay-offs you expect from each application. When adding these up try to take into account indirect and less tangible benefits that will result, as well as those that convert easily into dollars and cents. Improved information flow and efficiency are very valuable, even if they do not show up on the balance sheet at the end of the year.

Next, you should take practical considerations into account. You may not have the cash to acquire the part you would like to introduce. Some parts of the system may be too costly to install at once for a variety of reasons and may have to be introduced gradually or delayed until slacker periods in the business cycle. The way one part of the system will need to integrate with another (data, software and linkages) must be worked out.

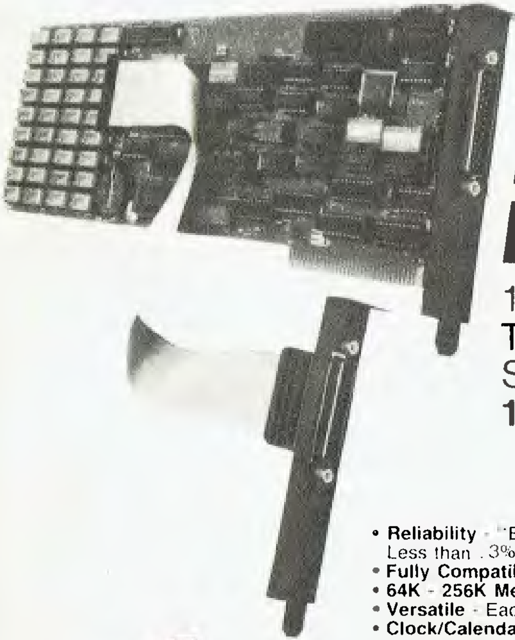
Finally, you will need to estimate how long it will take you to install the system and what outlays will be necessary in each period. Although this might be difficult for the later parts of the system, it is helpful to have some idea of when the equipment you will be installing first is likely to wear out and have to be replaced.

Conclusion

The homework you do now may take some time, but will help you to get more out of your microcomputer system earlier and avoid some expensive and frustrating problems in the future. Your supplier, too, will be in a better position to provide something of real benefit to your business.

Martin Ebbs is a director of a micro training organisation.

Required improvement	Areas for automation
Administrative productivity (reduce cost & time spent)	Repetitive recording and document production (Word processing; accounting systems; invoicing; payroll)
Customer service (enquiry response; delivery)	Preparation of proposals or tenders; estimation/quoting of prices or fees; Order processing; stock level checks. (File systems on customers, products; order processing & stock control systems)
Decision-making/analysis (speed up analysis)	Database management Decision support (financial modelling) systems
Communication and reporting	Budgeting system. Data transmission (spreadsheet & accounting systems; networking; telecommunication)



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A BALANCED VIEW MEANS A SAFE RIDE

Most businesses that are contemplating spending anywhere from $5,000 to $15,000 on a piece of equipment want to be sure that they will get a good return for their investment. That thinking holds just as true when the equipment in question is a microcomputer as when it is a new van or manufacturing machine. But unfortunately, the same guidelines that you use to help you evaluate whether to bring in a new van don't seem to apply when you are looking at micros.

In fact, buying a computer is one of the very few major investment decisions for which management accountants have no ready cost benefit formulae. And even when they seem to have, subsequent results usually prove their carefully quantified forecasts wildly wrong.

WEIGH UP THE PROS AND CONS OF BUYING A MICRO BEFORE YOU PUT YOUR MONEY DOWN, SAYS WILLIAM HORWOOD

The reason for this frustrating fact is simple enough: many of the benefits that follow computerisation are *indirect* and unquantifiable. Instead they relate to intangibles like staff morale, better information for decision making, improved customer service, and more direct selling effort.

This does not mean that you should walk into a shop and buy the first micro that fits in with the colour scheme of your office. Although it may be difficult to base your decision as firmly on dollars and cents as you might like, the business principles that you apply to the rest of your work should still apply.

Ian Beaman, the author of *Small Business Computers for First-Time Users,* suggests that prospective computer buyers take three steps before contemplating a purchase. The first is to translate your first vague thoughts about computers into firm — and practical — objectives and targets. Computers cannot perform miracles and there is no point in expecting one machine to do a variety of tasks that clash.

The next step is to identify the

specific areas that you want to computerise, try to work out how large a task that is likely to be, and then assess ways in which you can bring it about. After that Beaman suggests that you will be in a better position to try and assess the likely cost benefits of the changes that you would like to make.

There are some areas where you can try to apply a dollars and cents criterion to buying a micro. One is your sales ledger. Say, for instance, that it takes you 10 days now to do your billing and those bills are worth $20,000 a month. A micro that allowed you to send out those statements in five days instead of 10 could conceivably save you money by getting those bills paid more quickly. And if, like most businesses, you run an overdraft, that could then save you interest on your loan.

Other areas that might be susceptible to close cost analysis are stock control, direct mail and overtime. For example, you could now forecast savings that would result from decreased overtime.

But the people who generally advise on the purchase of a micro — consultants and salesmen — are very wary of suggesting that anyone buy a machine on the basis of such cut and dried criteria. And one consultant, Michael Turner, even says, 'Where you can put up a watertight case on costs alone there is usually something drastically wrong with the existing manual system.' As they do not believe that the figures tell the whole story they prefer to dwell on the less quantifiable benefits that a micro can bring.

Among these they list:

Time savings — on executive administration, on word processing, on billing, on estimating.

Income generation — from better debt management, from pruning unprofitable customers, from more up-to-date information, for marketing.

Management information — for long term planning, for short and long term financial management, for better inventory control.

Indeed, experts claim that companies that have tried to do rigid costings before they computerise often report afterwards that their original figures prove woefully wrong. Fortunately the fault usually lies in underestimating the benefits that the machines can bring.

Typical among senior managers in this position is Barry Doxey, financial director of a packaging company, who says, 'We had three Olivetti accounting machines and when it came to replacing them we looked at computers as an obvious part of our future . . . and I don't think we realised the full benefits they could bring, and I doubt if we have now.'

BUSY MANAGERS ARE USUALLY THE LAST PEOPLE TO BE ABLE TO ANALYSE COMPUTER NEEDS OBJECTIVELY

Doxey says that his company's Data General Nova 3 has 'transformed the organisation in some areas, particularly in the ability to review quickly historic data on previous deals with clients as they assess new proposals. The company realised that such management information might be available before the purchase, Doxey says, but the full potential was not really understood and, therefore, barely part of the evaluation process.

The fact that computerisation often turns out better than anyone had predicted leads consultants to warn of a positive danger in relying too heavily on cost analysis. Too great a concern with dollars and cents, they caution, could lead you to spend too little — and so lose opportunities because your system is really too small for your expanding requirements.

Often senior managers decide that computerisation is the coming thing and, after a fairly rapid assessment of what is available, come up with an estimate of what the company should be spending. This is very frequently based on talks with a couple of computer salesmen who may know their product well but wouldn't know one end of a balance sheet from another, let alone how to evaluate an investment proposal in terms that are relevant to an individual buyer's business and particular market needs.

CONSULTANTS WARN THAT TOO GREAT A CONCERN WITH DOLLARS AND CENTS COULD LEAD YOU TO SPEND TOO LITTLE

Nonetheless, this guesstimate often becomes the basis on which the company invites suppliers to quote. Since, inevitably, hardware tends to be the more expensive part of the purchase, an initial underestimate may be compounded as the buyer concentrates on hardware, which he can appraise more easily than software which is impossible to evaluate visually.

Elwyn Thomas, partner in a group of companies selling garden equipment and supplies, managed to avoid these traps — but only with difficulty. His company bought a computer system three and a half years ago.

'I spent six months on and off going to computer exhibitions, visiting showrooms and so on,' he recalls, 'trying to find out what I could and discovering I was getting nowhere.' From these contacts Thomas did come up with an estimate of what he felt the company — with a turnover of $715,000 a year at the time — should be investing in a computer system: $20,000 to $21,000.

'I can see now with hindsight that it was a considerable underestimate but that was the kind of figure that salesmen and people I met seemed to think reasonable. It was really only when someone quoted $83,000 for a system that I began to realise that perhaps I was out of my depth . . .'

It was about then that Thomas, fortunately as he now thinks, was introduced to a firm of computer consultants. They looked at systems which would satisfy the applications relevant to Thomas's needs and allow for the expansion that most users agree occurs once a system gets going successfully. At $42,000 the final choice was twice the original estimate, but Thomas used the payback method of assessing this investment, basing his calculations on a five year payback period and an assumed growth rate of 25%. Now, three and a half years later, growth has been nearer 40% and the company is already adding to its computer investment.

Thomas would not subscribe to anything as simplistic as the idea that this growth is 'due to the computer'. But he agrees that the systems thinking that has been imposed on his companies by computerisation and the release from administration it has allowed him and his colleagues so they can concentrate on profitable development of the company, would need to be a part of any evaluation of the cost benefits that have arisen. And he agrees that to assign values to such gains would be very difficult indeed.

One of the principal reasons managers like Thomas find they are out of their depth in the early stages is that the kind of data processing and systems analysis a business needs to go through in assessing its computer needs requires a specialist skill. And busy managers are usually the last people to be able to conduct such an analysis objectively, or to see the interdependence of different problems and solutions.

This difficulty is compounded by the fact that it is very often a firm's accountant or commercial director who is involved in computerisation. The problem with this is that accountants tend to be slow to see beyond the numbers to the human implications, good and bad, of proposals they are deciding on or making recommendations about, and this can be far too limiting.

The extreme difficulty that most business people who have installed micros report in coming up with any really valid method of costing the benefits of computerisation or deciding in retrospect what the financial return has been is a warning to any buyer who thinks there is a simple way of deciding what to buy. It is also a warning against any salesman or consultant who tells him there is.

The best advice for prospective buyers seems to be that you should rely on your own judgment tempered by a good feasibility study and careful analysis of how your growing business is organised and what potential applications for computers there are. With this exercise behind you, you may not be able to forecast value gained from the investment in dollars and cents, but you can begin to ask suppliers the right questions.

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CATCH YOUR PROGRAM

IF YOU KNOW WHAT YOU WANT, THE NEXT STEP IS TO FIND IT. FIONA NEWMAN ADVISES

Software is the most important part of your computer system so it is worth spending time making sure that the packages you buy are right for your business. Unfortunately it is difficult to see exactly how good a package is until it is paid for and installed in your company. You can't set up software properly with all the data you want to use when you are looking at a showroom demonstration, or studying the specifications of software that is being written for you.

Even so, choosing software doesn't have to be a hit and miss affair if you take certain safeguards before parting with any money.

The first step is to decide what your computer system has to do, how much work it will have to cope with and how much your business is likely to expand over the next few years. You should also note down any peculiarities of the manual methods you use and any problems that could be solved by introducing a computer.

Businessmen and computer people are notoriously bad at understanding each other. So it is important for you to have a clear idea of what you need to convey this to your supplier.

It is worth buying hardware and software from the same supplier so that he is familiar with your whole system and can advise you if things go wrong. It is also worth considering a local dealer first so that help is always close by.

But you should remember that unless you want a common package such as financial modelling, you might have to pay for modifications to existing software however far afield you look for a supplier.

choosing·software

'No software package will satisfy a user's needs,' says David Barella, managing director of a company selling small computers. 'You may get a 90% match because you can bolt extra pieces of software onto a module or recommend that a user changes his way of working.'

becoming·a·guineapig

But paying for modifications and putting up with a few shortcomings in a package can be a cheap and adequate alternative to buying expensive software written for you from scratch.

Once you have found the suppliers that claim they can help you, you should ask for customer references.

Written to order

If existing packages are going to be modified for you then you may not be able to visit a user identical to yourself. But if a supplier can't show that he has any experience in your type of software it might be worth going elsewhere.

'You don't want to be a dealer's first customer on one implementation,' says Roger Leach, managing director of a company specialising in the supply of complete microcomputer systems. 'You should go to someone who has already supplied similar systems, get customer references and visit these users — and you should go through this process at least twice,' he adds.

Once you have chosen a supplier you should expect him to visit your business to see how the work is done. He should then draw up a written presentation based on your needs to say what the new software will do.

'A dealer should come down and see your business without question,' says Barella. 'It is highly unprofitable but I can't see any other way to do it because it saves on problems later.'

This is vital if software is being written or modified for your business because you will have to be sure that the supplier really understands your needs. Once he has drawn up this presentation you will be expected to show him evidence of your commitment before any more work is done. This is usually about 50% of the total estimated cost of the work.

Off–the–shelf

Things will be rather different if you are buying software straight off the shelf. You probably won't get a visit from your supplier unless you are buying an expensive suite of programs costing several thousand dollars..

You may even find that he is unwilling to spend much time giving you a

the·selling·points

demonstration of the software in his showroom. 'With a very cheap package you are unlikely to get a very long demonstration because there is not enough profit for the dealer,' says Colin Harris, managing director of a specialist supplier of accounting software and databases.

Even if the package is demonstrated using a small amount of your own data you don't get a fair impression of how it will cope with all the data you will be using. When the manufacturer provides a demonstration disk with its own test data it can be even more difficult to assess a package's true worth.

manuals·are·not·enough

'Demonstrations with test data are specially constructed to emphasise the selling points of the software and suppress the bad points,' says Leach.

Some companies now sell software on approval with a special demonstration disk. Ashton Tate, for example, sells its dBase II database software in this way. You buy the package, which is specially sealed, and a demonstration disk. If you are not satisfied with the demonstration you can send the software back providing the seal is not broken.

But the demonstration disk only contains 15 records, the maximum the software can look at without accessing its disks. This gives the impression of greater speed than you would get if more than 15 records were stored on the database.

Sky Quinn, product manager for dBase II at Ashton Tate, admits that the system works faster on a small number of files but denies that the demonstration disk only holds 15 files to give a false impression of speed. 'We don't want to give dBase II away and we think this is a good marketing policy,' he says.

So even if the software is only costing $300 or so, it it still worth asking to see end users to find out what kind of support they have received from the supplier, and how well the software really works rather than relying on demonstrations alone.

There are also certain tests that you can do yourself. You should try out the software unaided to see how easy to use it really is. If it has been well written there should be plenty of screen messages to help you and you should never be left sitting helplessly in front of an inexplicable display.

It is also a good idea to look at the manuals to see how easy it is to set up files and take back-up copies of disks.

The manuals

'Manuals are the last things to be done with software,' says Harris. 'If they are bad you need to watch it but it doesn't necessarily mean that the software is poor.' You might still decide to buy the package if you are confident that the supplier will give you enough support to get the software up and running and to help you learn to use it.

'There are at least 30 spreadsheet packages and for the end user they are virtually identical,' says Leach. 'What matters is that he gets the package from a company that will help him to get it working and help with using it because generally manuals are not enough for the innocent end-user.'

You should also check that the software could cope if your business expands, and what any modifications would cost.

It is also important to know if you are entitled to free updates when the software manufacturer makes changes to the program, especially if you are buying a payroll package which will need frequent updates to keep up with changes in legislation.

Support from your dealer is also an important consideration. But you won't get too much on-site help unless your software is expensive. With packages costing a few thousand dollars the price should include several working days which can be used for training your staff, setting up the software, or putting your data onto disk.

With a cheaper package you will probably have to pay extra for this kind of service and it can cost around $200 a day. Still all dealers and suppliers should answer as many phone inquiries as you need to make, free.

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WITCH SOFTWARE?

BSTAM, BSTMS

Two programs which allow a microcomputer to send data and programs to other computers using a modem. BSTAM is for micro-micro communications, BSTMS is for micro-large mainframe purposes.

CARDBOX

Database management program for storing and retrieving any kind of textual or numeric information, but rather weak on sorting and calculations from that data.

CBASIC

Digital Research's version of the Basic programming language for use with CP/M micros. It became popular for business applications as (unlike some other early versions of Basic) it eased the task of producing nicely formatted output.

CIS COBOL

A microcomputer version of the Cobol programming language which is the most widely used language for commercial applications on larger computers.

DATASTAR

A simple database manager which comes from the same firm as the widely used Wordstar word processing program. Files which are produced from Datastar may be used and edited by Wordstar or used in mail shots by the Mailmerge program.

DATEBOOK

An electronic office diary program which is designed to aid professional people schedule their working time. Datebook's main advantage over conventional diaries is that the program will advise the next time when a selected group of people will be free simultaneously to attend a meeting.

DBASEII

A sophisticated database management program with facilities for sorting, processing, and merging different data. Includes a programming language, which can be used instead of Basic etc, but it is not suitable for inexperienced users as some familiarity with programming techniques is needed to get the most from it.

LOTUS 1–2–3

A "new generation" spreadsheet with integrated data management and graphing facilities. 1-2-3 has the reputation of being significantly faster than other spreadsheets.

MATHEMAGIC

A program which helps with mathematical calculations. Formulae can be stored on disk and then be called up again by a code so that they can be used in other formulae.

MBASIC

Microsoft's version of Basic, supplied many microcomputers.

MICROMODELLER

Financial modelling program from Intelligence (Aust) with extensive graphics features to produce graphs and charts from financial data. Micro-modeller requires you to enter formulae in lines rather like a program. This makes it more versatile, but a little less easy to use than 'spreadsheet' programs, which give you immediate feedback on what you are doing to the figures on the screen.

MULTIPLAN

Spreadsheet program which has built on the foundations laid by Visicalc. One of Multiplan's more important features is its ability to merge elements from a number of different spreadsheets into a summary report, which removes the need to store everything on one disk.

OPTIMISER

Package which uses linear programming techniques to find the optimum combination of factors to achieve a best result.

SUPERCALC

CP/M-based spreadsheet package, features locked cells which prevent you from destroying formulae or data inadvertently.

STATPACK

Statistics program which provides mathematical tests on data which are not built in to most programming languages.

SUPERFILE

A database program which differs from most in that it allows you to enter data in a free format rather than a predefined card index type layout.

VISICALC

The original 'spreadsheet' program. Spreadsheets are programs used for tasks like cash flow reports and budgeting. The main difference between using a program like this and conventional analysis paper methods is that you are able to enter the relationship between figures rather than just the figures themselves. In this way you can arrange that a certain row on the screen is automatically calculated as a total of rows above. Visicalc is part of a series of programs, which includes Visiplot and Visiword, some of which can be used together.

WORDSTAR

The 'standard' word processing program as it has outsold all others. Wordstar is compatible with several other packages provided by other software houses. It is useful to use programs like database and mailing list managers with a word processing program, especially if they use the same files of information.

ZARDAX

A popular Australian word processing program for the Apple II.

RUNNING ORDER

A MICRO MUST HAVE AN OPERATING SYSTEM BEFORE IT WILL RUN ANY OTHER PROGRAM. MICHAEL FOREMAN EXPLAINS THE NAMES

An operating system is the program which a microcomputer must have before it will run any other programs. In purely practical terms an operating system rarely achieves anything that is obviously useful, but it will be the largest factor in determining which programs are available to owners of a certain micro.

A great number of operating systems are designed for one micro only, for example Apple's DOS and PCOS for Olivetti's M20 micro. But for the purposes of this guide we have concentrated on some of the better-known 'standard' operating systems which are likely to appear on a number of different machines.

CP/M

CP/M (Control Program for Microprocessors) was developed by Digital Research originally for Z80 and 8080 8-bit micros, and it is now the most widely used operating system for this type of micro. More packages are available for CP/M than for other generally used operating systems. Digital Research has since introduced two different 16-bit versions of the operating system, CP/M-86 (for micros with the Intel 8088 or 8086 processor) and CP/M-68K (for micros based on the Motorola 68000), but they have not attained the dominant position enjoyed by the original 8-bit version.

In the past CP/M has been criticised for its poor standard of documentation but things have improved recently. Unfortunately the meaningless error messages ramain. For example, the message 'Bdos Error' can appear on the screen for more than one reason, which makes fault-finding difficult.

MP/M is a multi-user version of CP/M, but some programs need extensive modification before they can be used in a multi-user environment, and this has limited the number of packages available for this operating system.

UCSD p–System

UCSD stands for University of California San Diego where the p-System originated. This operating system is closely associated with the Pascal programming language although it is possible to use many other languages as well. The p-System is available on a surprisingly wide range of computers ranging from super-minis like the DEC VAX-11/780 right down to small microcomputers.

The UCSD p-system is 'user-friendly' in some respects as most commands appear on a one-line menu on the screen, but it also has some features which have been found to deter first-time users. For example, the disk drives in a twin drive microcomputer are referred to as disk#4 and#5 rather than A: and B: which is usual on other systems.

Unix

A powerful multi-user multi-tasking operating systems which is held in high regard by programmers. Unix (the name is derived from 'Universal Operating System') was developed in the United States by Bell Laboratories, but a large number of 'lookalikes' and derivatives are available.

The programmers' enthusiasm for Unix stems mainly from its powerful commands and utility programs. Commercial users may be attracted by its file management features which help a number of people using the same computer to find the items on the disk which concern them, rather than wade through a list of the entire contents.

MUMPS

Mumps has been described as 'more than an operating system' as it includes a database management program and a programming language as well. It was originally developed in the United States for storing and retrieving medical records on minicomputers but it has since been used on other types of data, and microbased version of the operating system are now appearing.

BOS/5

(Business Operating System). Originally developed by British software house MPSL in 1977, it is now in its fifth version. MPSL has also produced MBOS/5 (for multi-user micros) and BOS/NET (for networking). A valuable feature of the BOS operating systems range is that it is possible to run an identical program on any one of them.

MS–DOS

(MicroSoft Disk Operating System). MS-DOS was designed for the IBM Personal Computer (on which it is known as PC-DOS), but it is also used by a number of other micros which are based on the Intel 8088 or Intel 8086 microprocessor. MS-DOS in its first version differs very little from CP/M-86 in actual operation, but some aspects of its technical specification are different. Later versions of MS-DOS incorporate a number of Unix-like features.

SEARCHING FOR A BETTER DEAL

WHERE SHOULD YOU GO ONCE YOU'VE DECIDED TO BUY? FIONA NEWMAN ASKS IF THERE ARE ANY PRACTICAL ADVANTAGES IN GOING TO AN 'AUTHORISED' DEALER

One of the big problems with buying micros in the past has been the 'fly by night' dealer — the computer shop that opens one month and closes the next, leaving its bewildered customers in the lurch.

Now many manufacturers are trying to combat this image with something that they call authorised dealer programs. Under these schemes dealers must go through some sort of vetting procedure to win the privilege of selling a certain manufacturer's machine. The implication is, of course, that anyone who has successfully gone through this procedure is a safer bet for the customer than their unauthorised brethren.

But, as is often the case, there seem to be as many meanings for the word authorised as there are companies that use it. In some cases it means that the manufacturer has checked its dealers' books, ensured that it has a business and marketing plan, put some of its staff through a training program and stocked it with spare parts. In others it means little more than that a dealer has committed himself to sell a certain number of machines.

These varying definitions make it difficult to know just how much of a safeguard it is to go to an authorised dealer. Theoretically they are supposed to provide customers with a better service because they are financially stable and, due to their close contact with the manufacturer, they know a great deal about the micros that they sell. They are also supposed to be provided with software updates to pass along to customers and can sort out any problems that can occur when and if your machines happens to go wrong.

By the same token unauthorised dealers are not supposed to be such a good bet since, although they can sell you the machine itself, the fact that they have no special relationship with the manufacturer means that they may not be able to provide you with the back-up you need. They are also, so the theory goes, more likely to vanish without a trace, and if that happens you could be left without any support for your machine.

Plusses and minuses

In fact, there are plusses and minuses for both authorised and unauthorised dealers. You may, for instance, be lucky with an unauthorised dealer if it has a good relationship with an authorised dealer for your machine. Then you might well find that your warranty is honoured and software back-up provided.

On the other hand you might not. 'There are certain technical reference manuals needed for some micros which you don't get if you are not an authorised dealer,' says a dealer authorised to sell Sage and Sirius machines. 'You might not get advice on software upgrades or on new developments such as an error that has been found on the dism,' he explains.

machines sold by unauthorised dealers, if they do go out of business they are reluctant to say that they will offer support because they claim that this would encourage more people to go to unauthorised dealers.

Even if your dealer doesn't go out of business other problems could arise if he isn't authorised to sell your equipment or has got hold of your micro on a one-off basis. If your machine is the first of its type that your dealer has dealt with there is a chance he won't know enough about it to help a new user. It is fairly easy for a dealer who sells CP/M machines to take on a micro with the same operating system. But a problem would arise if a dealer who usually sells the Kaypro, which runs under CP/M, got in a Fortune micro, for example, because this runs under Unix.

Authorised dealers have drawbacks as well. Although many companies claim to make sure that their dealers all meet certain specifications it is very difficult to know how rigidly they apply their selection criteria. Indeed, many authorised dealers themselves claim that manufacturers are not quite as choosy as they appear to be. 'Most manufacturers say that they want credit references from potential dealers, but when it comes down to it they want another outlet,' says a director, an authorised dealer for a number of machines, and an unauthorised dealer of the Sirius.

But perhaps the biggest shortcoming of many authorised dealer programs is that they include a stipulation that a dealer sell a certain number of their machines each year. There is a danger that dealers who are behind on their quotas might push a machine whether it is right for you or not. If they are committed to selling a large number of machines, support could suffer as well, as they devote their time to meeting their sales targets.

For this reason, some people argue that there is little difference between authorised and unauthorised dealers, saying that if you go to a dealer and ask him which computer suits your needs he will tell you the best one from those he is selling.

They believe this is perfectly legitimate as long as buyers accept that this is the kind of advice they will get. One consultant told us, 'even the best dealers will tell you that you need a computer, and it is tempting for them to sell you a large micro rather than a smaller model.'

Some authorised dealers take issue with this argument. They say that they are beginning to do consultancy work as well as selling micros, and maintain that this qualifies them to sell to the first time user. One dealer claimed that he would never push a machine which was unsuitable just to make a sale. 'Because we have set up the company as a consultancy we only supply (here he mentioned a particular brand of microcomputer) to people who want it, never for a first time user. For a newcomer we would recommend a different system – it would quite often be cheaper but it would be a better machine,' he says.

Another authorised dealer claims that his company also offers consultancy. 'We have equipment for 80% of requirements but if we don't think a machine is suitable for a customer we will say so and point him towards someone else – we wouldn't get the equipment in ourselves,' he says.

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DEALERS ON TRIAL

Buying a micro can be difficult experience for many business people simple because it means entering entirely new territory. When you walk into a computer shop you may feel that you are entering a foreign land where the people speak a different language. All too often, in these circumstances, business people suspend their critical faculties.

That need not be the case. There is no reason why buying a micro cannot be just as informed a decision as buying any other crucial piece of equipment for your firm. The key to success is knowing enough about your business to tell someone else what you want.

The next most important step is finding a good dealer who can satisfy your needs and provide you with support. This doesn't have to be a hit and miss affair. Because the dealer you choose is so important to the success of your system, ABC decided to find out how you can spot the best ones.

Make out a detailed specification first of what your system must do. A specification is a useful way of pinning the salesman down on certain important points. It should force him to justify his choice of software rather than simply claiming it is bound to suit you because it is so flexible.

Visit as many dealers as possible or, if you don't have a lot of time, at least go to a few who stock several different micros instead of just one. You should do this because even the best dealer will only tell you what is the right system for your business from what he has in stock.

Start with what you think is likely to be the most difficult requirement. If you need a multi-user system, for example, it is no use presuming that all micros have this facility — even some well-known machines like the DEC Rainbow and the IBM PC don't at the moment. If you begin by concentrating on a few minor considerations you could waste a whole morning.

Insist that your dealer spend most of the time explaining about the software you need, and above all insist on a demonstration to show you how it will work for your business. No matter how long the dealer spends talking about the software, don't be content

with just a verbal explanation of what it does.

Getting a demonstration is the only way you can check whether or not a system is suitable for your needs.

QUESTIONS TO ASK YOUR DEALER

	YES	NO
1. Are you prepared to spend at least half an hour going over my specification?	☐	☐
2. Will you explain the software in more detail than the hardware?	☐	☐
3. Will you demonstrate the entire system?	☐	☐
4. Can you supply the package that I need *now*?	☐	☐
5. Can you speak to me in easily understandable English?	☐	☐
6. Can you show me to my satisfaction why I need the amount of storage (or memory) that you are recommending?	☐	☐
7. Can you justify the type and price of printer that you are recommending? (Could I get away with a cheaper model?)	☐	☐
8. Do you have people on your staff who know about accounting and computer programming?	☐	☐
9. Can you supply someone to key in my data?	☐	☐
10. Do you offer training?	☐	☐
11. Can you supply references from customers using a similar system?	☐	☐
12. Can you devote more time to talking about your system then to insulting competitive products that you don't stock?	☐	☐

If you cannot tick more than half of the yes boxes on our check list you may be talking to the wrong dealer.

Ask if the dealership employs someone with a computer programming or even an accounting background to show they understand the systems they sell. This could be important in the future if you have trouble with your system.

Make dealers explain how they have worked out the amount of storage you will need with your system.

Question your dealer carefully on printers. Opinions on whether a printer is fast or not seem to vary. A useful yardstick is that to be described as 'fast' a dot matrix printer needs to do 120 characters per second, and a daisywheel printer 40 or more.

Always ask for customer references. Dealers should be prepared to do this and you should be unmoved by any who pretend to be offended or suprised. But you can't expect a dealer to inconvenience his existing users by sending you to see them when you are only vaguely considering his system. You will have to express a serious interest first.

Discuss setting up the system before you part with any money. Most dealers will set up the software before demanding final payment, and also give a certain amount of training with each software package you buy. But you should allow for all the time you will have to spend putting your own data into the system. Some dealers will key information in for you at an extra charge — (I was recently quoted $1.60 per thousand keystrokes for such services) if not they should be able to put you in touch with someone else.

Bear in mind that two dealers authorised to sell the same product can vary greatly.

If dealers are to be your major source of advice, asking the questions in the box on the right may reassure you about their professionalism and standards.

Following the plan we have drawn up as a result of our visits to dealers won't guarantee you success, but it will give you a yardstick so that when you visit dealers you will be better equipped to spot the good ones and weed out the bad ones.

WATCH THE EXTRAS

Usually it is only in the weeks following installation that buyers of new microcomputer systems start finding that the real costs are greater then they budgeted for originally.

New invoices start arriving from the supplier – for those extra floppy disks that the training girl brought with her when she came to give staff the agreed day's training; for ribbons and paper the buyer knew he would need but did not bother to price out; for the special daisywheel that has a ¥ sign for export customer invoices . . .

Then there's the special security holder for the back-up copies of the floppies, and the question of whether the office is going to need a fire-proof safe to ensure that master copies are completely protected . . .

After a month the printer that sounded so quiet at the computer exhibition is beginning to seem unacceptably noisy to the staff in the office where it is kept, so a $500 acoustic hood is needed.

Mundane items like these, and essential extras such as maintenance and insurance, add enormously to the real cost of a computer system. They are rarely mentioned by salesmen because they know that it is the bottom line of the initial calculations that may decide what hardware is bought.

In a market that is increasingly turning computer hardware into commodity items initial cost becomes all important.

Together these extras are so significant that a buyer cannot afford to leave them off initial budgets, even though they may be irrelevant to the choice of system. These costs will arise *whichever* system is bought.

Brian Richards is responsible for a consultation service to businesses and reckons that 'even to add 20% of the initial hardware and software costs to allow for hidden extra costs is probably a bit on the low side, if you want to be prudent.' He agrees that 25% is probably nearer the mark.

So for a basic business microcomputer package costing about $7,000, the hidden costs are likely to add an extra $1,800 or so in the first year.

Some of this will be one-off costs, such as furniture to hold the new equipment and electrical re-wiring which the positioning of equipment may demand; other items such as a maintenance contract and insurance will be continuing costs implicit in the initial outlay but often missed.

FEW DEALERS MENTION THAT THE RUNNING COSTS OF A MICROCOMPUTER CAN PUT 25% ON ITS INITIAL PRICE IN THE FIRST YEAR OF OPERATIONS. WILLIAM HORWOOD TOTS UP

The items and prices that follow can only be guides since each case differs and as the microcomputer market expands competition grows fiercer and prices get more volatile. The rule now is that it is worth shopping around for computer supplies, especially if the system was bought from a major national supplier who may charge a premium for the everyday extras just as some restaurants make their profits on the wine.

The biggest initial extra for buyers is likely to be the maintenance contracts business users are invariably offered at the time of purchase. It is worth noting that some suppliers do not necessarily recommend maintenance contracts at all, but the general assumption remains that business users will rely so heavily on their computers that it is too costly to risk them 'going down' for days on end. This whole area is a minefield of differing terms and practices but the costs can be fairly simply estimated. The rough guide is that the figure will be about 10% of the initial cost of the system.

In practice it usually runs rather higher than this. The maintenance contract that goes with one business micro, for example, is typical of many offered by bigger suppliers. It works out to rather more than 13% for a one-year contract. So on a purchase of approximately $5,000 – a screen/processor, keyboard and double disk drive – the cost would be around $650 a year.

Several points will affect the actual outlay, apart from the key one of the initial term where suppliers weight the figures to encourage buyers to commit themselves for a longer period.

Some smaller and less reputable dealers will ask buyers to take out a maintenance contract immediately, even though the systems will be covered for an initial warranty or guarantee period of three months or more. In this case the buyer is effectively giving the supplier free use of his money for a period.

A second and even more insidious practice is the habit some suppliers have of calculating the maintenance figure as a percentage of the initial outlay *even though* this often includes a substantial element for software bought at the same time. Clearly maintenance is for hardware and the two should be separated before any maintenance costing is made. It pays to have pencil, pad and calculator handy when buying.

From this it is clear that maintenance is such a heavy initial and ongoing cost – buyers will pay over 50% of the initial hardware costs in the first five years – that it should be a major element in costing out a system. Apart from the cost the buyer must be sure that the supplier can deliver the maintenance offered. If he cannot, then the buyer may be involved in heavy additional cost because his system is not working, or takes days or weeks to put right. To avoid this, check out the maintenance by talking with other clients using the service, or even check-calling the service number direct to see how efficient and prompt it is. The salesman's 'four to six hours' may in practice turn out to be a day or more when buyers finally speak to the helpline.

Poorly-assessed software can be an expensive mistake if it has to be scrapped or modified.

It is difficult, if not impossible, to assess software before using it (unless you can rent it. This is one reason many first-time buyers ignore the normal advice to choose software first and instead concentrate on hardware. As a result many end up buying the wrong software and either have to invest in new packages, or spend money and time having professional programmers write software to their specifications, or modify existing software. (Some buyers end up with hardware for which the right software cannot easily be bought at all and may have to write off their initial investment).

MAINTENANCE SHOULD BE A MAJOR CONSIDERATION WHEN YOU ARE WORKING OUT THE COST OF A SYSTEM

Either way most buyers find that very soon they need additional and expensive software. The market rate for programmers is $20-$30 per hour and the cost of tailormade software very quickly runs into four figures – considerably more than the database, word processing and financial modelling software that brings many smaller businesses into computing in the first place.

There is a case, if a buyer is to reduce the final costs of switching to computers, for hiring a consultant whose costs may be charged on an hourly basis or may be carried by the supplier as an introduction fee (with the obvious problems of bias that implies).

Despite the natural bias consultants have for the importance of their own profession, most experienced users would agree with Roger Leach, consultant with a wide experience of start-up situations. 'Too often small businesses are sold software as if it was a bag of chips. For example, they might buy a nominal ledger package from a salesman who wouldn't know a nominal ledger if it fell on his head,' he says. Leach argues in favour of the kind of complete review of software needs a consultant can provide before a system is bought to avoid future extra costs.

After maintenance and software cost comes expansion. Although the need to plan for expansion in office space, capital requirements and staffing is obvious to any growing business, expansion of computer investment is often overlooked. As a result users may very quickly find they face heavy additional costs if their system is to cope with the workload they are putting on it. As Maurice Hamlin, managing director of a consultancy puts it, 'Most buyers and especially first-time buyers know neither the real computing needs of their business or the capabilities of what they are buying. Many set a budget which is unrealistic and are then suprised when six months after installation they have to start again . . . at enormous and unnecessary expense.' Like Roger Leach, Hamlin will always start from the software needs of the client and then suggest the best hardware to service it.

Furniture and storage are also likely to be forgotten.

There is something about investing several thousand dollars in a microcomputer system that focuses managers' minds on the importance of office furniture to go with it – but usually only once the system is installed.

David Davenport, director of an office equipment group that specialises in computer supplies, believes the reason 'is not to do with the way it looks so much as the discovery that operator efficiency is directly affected by the ergonomics of the office enviroment. If you've just spent $8,000 on a system you want it efficently used.' Inefficient storage, awkward desk legs preventing quick movement between one working surface and another, and untidy and possibly dangerous cables, tend to show up more in an automated office, and may even be the result of it.

Computer suppliers and manufacturers have been slow to get into this market because of the high inventory costs and relatively low margins involved in office supplies. Computers are better business. This has meant that to get the right furniture tailored to the special needs of moveable keyboards, heavy disk drives and noisy printers, users have had to pay sometimes prohibitive prices. Yet because it is needed, and because staff and union pressures insist on it, this has been a major hidden cost for many buyers.

In the past two years this market has begun to develop and prices have fallen as more basic, practical and cheap furniture has become available. Suppliers like Compucare can now provide sufficient furniture and storage for a single micro system with printer for a few hundred dollars, but it is very easy to spend a much larger sum.

Unfortunately, many suppliers have so far done little more with furniture than put VDUs and printers on existing lines and take photographs. Real tailor-made furniture is still the exception.

Supplies and stationery are the next cost. Paper, special stationery, printer ribbons, printwheels . . . the list is endless and the cost can mount up despite the relatively low individual item cost. Interestingly, one supplier reports that his firm's average order is about $300. Against even small turnover figures such an order will seem minute but there may be several orders a year and taken as a percentage of the system's cost, which is the best way of looking at 'hidden' costs, the cost of supplies may be significant.

Probably the biggest underestimate in initial computer budgeting is in floppy disks. As one visitor to a recent office automation exhibition ruefully put it – a management consultant who in the circumstance prefers to be anonymous – 'I suppose when we started our present consultancy a year ago I might have forecast a need of 100 disks and I'm meant to be able to predict these things. Today we must at the very least have 300 disks in use . . .' Buyers forget the need for back-up security disks and that it may be convenient to keep different file ranges on different disks even though one might hold them all together. But at $4-$5 a time floppies can turn out expensive.

The last hidden cost dealt with here is insurance. Despite its obvious importance the cost of computer insurance is relatively low. Many users will be using computers both for pleasure and for business and the two rates can vary.

Typically, a system costing $8,000 for hard and software with data whose clerical cost of replacement would be $25,000 (not unrealistic for even small businesses) would cost about $150 a year to insure. But note that the *value* of lost data to the user (as opposed to the clerical cost of replacement) is not covered by this kind of policy and is in practice difficult to insure.

One advantage of special policies is that they focus on the need to update policies regularly – the replacement cost of inputting data onto disks mounts steadily through the year.

The list of hidden costs can go on and on. Some users, for example, choose to get a 'clean' power supply installed for computer systems because of the power failure/surge risk that occurs in factory environments. Others send staff on training courses (though these ought to be included in the initial purchase) . . .

As a rule of thumb buyers can reckon on adding 25% at least to the original hardware investment in the first year of operation. After that future running costs can be based on a careful appraisal of first year costs. Which, of course, the new microcomputer will do for them in seconds . . .

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APPROCHABLE PROCESSING

WHAT IS IT ABOUT THE NEW BANK STREET WRITER WORD-PROCESSING PACKAGE THAT HAS CONVERTED SO MANY ANTI-COMPUTERITES? STEPHEN MANDELIN INVESTIGATES

Judging from the enormous success that the *Bank Street Writer* word-processing package has been in the US, many people believe that it will change the way the next generation of school children learn to write. Since its release in December 1982, it's climbed to the top of the American top-selling program charts. So why is this program so different from other word-processing programs? Does its success reflect its quality?

The *Bank Street Writer* was developed specifically as a tool for student writers by International Educations of Watertown, Massachusetts in co-operation with the Bank Street College of Education of New York. Bank Street College is a leader in all aspects of education and teacher training.

Researchers at the Bank Street College found that word processors designed for adults were not meeting their students' needs. Ideally, a student should be able to learn all about word processing from the software itself, leaving a minimum need for documentation. The staff at the Bank Street Centre for Children and Technology in New York decided that they would re-invent the word processing wheel one more time, and sold the concept to Broderbund Software (for the home market) and to Scholastic Inc (for marketing to educational establishments).

Bank Street even appears to be turning computer haters onto computing – from English teachers to busy businessmen with no time for manuals. Most word processors are business tools, not writers' tools. They are superb for somebody who uses one all the time and cares about formatting, but not for someone who simply wants to write. The idea of an easy-to-use word processor is not earth shattering – what is suprising is that nobody had ever done it before!

The criteria for the *Bank Street Writer* was that it had to run on a minimum configuration (48k) Apple (which had the largest installed base in US Schools), off a home television set, on a single disk drive, and require no expensive add-ons – and it had to be very inexpensive. In other words, the program had to be completely resident in memory and feature a hi-res page to permit upper and lower case without hardware modifications.

The program loads in just nine seconds, and puts you instantly into the writing mode. There are no menus to study, just a blinking cursor awaiting your entry in the text window. The cursor sits in the upper-left corner of a rectangle that represents a page. Prompts above the rectangle, at the top of the screen, give all the instruction you need.

For capital letters on the Apple II+, you hold down the shift key and hit the N/inverted claret key. On the Apple IIe, the program recognises the shift key. Want all caps? Hit N a second time while holding down the shift key. To erase, strike the left arrow key. Want help or want to change something you have written? Just hit escape and you are in edit mode guided by a new set of prompts above the window. Change your mind again and want to write? Just hit escape and toggle back into writing. It is that easy – and what's more, you can do it without reference to a manual.

Bank Street sports a handy, pocket-size manual of 28 pages, but you really do not need it. And why should you if all you want to do is get down to writing that occasional letter, memo, or school paper. *Bank Street* does not support the exotica of word processing – underlining, subscripting and superscripting, and split screens.

What most of us need is basic editing power, and that *Bank Street* delivers. The Edit mode offers five choices; erase/unerase; move/moveback; find/replace; transfer menu (which transfers you to the save, retrieve, and print functions); and a cursor control emblem (for the Apple II+ a diamond-shaped display of the I-J-K-M cursor control keys – each key is depicted on-screen as an arrow and points in the direction it moves the cursor).

Specific functions are selected by manipulating a highlighter using the left-right keyboard direction arrows for lateral movement, and the space bar for vertical, (For the Apple IIe the four cursor direction keys are invoked automatically).

These visual prompts are all a user needs with a short file, but the program also supports a second level of useful control keys. To learn these, you are obliged to study the manual; but the commands are easily committed to memory. They are simple and logical – control B to move the beginning of a text file, E for end, U for moving up 12 lines, D for moving down 12 lines, S to count the word space left in the file, I to indent eight, 16, 24 or 32 spaces, and C for text centering.

When you are processing text, there is nothing to remember. Everything you need to know is up there on the screen, one logical step after another. If you want to erase text, select that function with the highlighter and hit return. The program instructs you to place the cursor at the beginning of the passage you are deleting, followed by return; it then tells you to place the cursor at the end of the passage, followed by another return, with the cursor highlighting the entire block as it moves from the beginning to the end of the passage. To delete simply answer 'yes' to the program's 'yes/no' prompt.

In most programs, text deleted is text wiped out. Not with the forgiving *Bank Street Writer.* It lets the writer recover their precious words by selecting a command that makes perfect sense to kids of all ages – namely, UNERASE. This is the sort of inspired flexibility that makes this program so refreshing. School children do not delete, they erase; and they unerase. Their ideas of word processing are, after all, formed by pencils, erasers and smudges.

'Erasing is a very scary thing for kids,' says Richard Ruopp, head of the team that developed *Bank Street.* 'That sounds silly, but when you erase something, it has gone. Both the erase and move-back function of *Bank Street* give

When it comes to printing, *Bank Street Writer* provides two options – Print Draft and Print Final. The latter asks the usual default questions about spaces between lines and page numbering. The Print Draft option prints a file exactly as it appears on-screen, with 38 lines of text per page. That does not tell an adult how the text will format in a standard 65-character-line business letter, but it is great for kids who have yet to graduate to conventions of adult correspondence. What they see is what prints out, with generous right-hand margins to be used by teachers or the kids themselves to write notes in.

Bank Street is a powerful package, but it is not all-powerful. It supports indents at 8, 16, 24 and 32 columns, but not tabs. The first-time user is apt to confuse the highlighted indent with a tab, however, because only the initial indent appears on-screen. The others are omitted to save display space. In addition, *Bank Street* has no keyboard buffer allowing immediate recovery of words deleted with the left-arrow key in the right mode.

Another limitation concerns moves and erasures of copy within text files – they are limited to 15 lines. To delete more than 15, it must be done in segments, should you forget and try it anyway, friendly *Bank Street* will throw you another prompt. If after erasing a passage, you return to the write mode and enter any new text or make alterations, you will not be able to unerase your most recently deleted copy. Files in excess of five pages single-spaced, tend to slow performance, so users are urged to break them into shorter ones to be recombined during printing.

Bank Street does have its shortcomings, but many of them can probably be minimized, if not overcome. The beauty about software publishing compared with book publishing, according to Ruopp, is that it is more forgiving. It is as much a process as it is a product; you are encouraged to learn from your mistakes, because corrections are easier. So there are enhancements already in the works – like tabbing, extended indents beyond column 32, a Spanish language version – to meet or anticipate user needs or complaints.

The biggest annoyance to date concerns the inherent limitations of the 40-character screen. It does not correspond to the standard 65-character printout. As a result, some users complain that it is awkward typing date blocks so that they are flush with the right-hand margin, though this difficulty can be minimized by hitting the Control-C centering command and estimating from there. Fancier word processors, such as WordStar, allow users to suppress prompts and take short cuts as they grow familiar with a program. *Bank Street* is less flexible in this regard, at least in the current version.

The target market for *Bank Street* probably wants all the handholding it can get. Ruopp suggests that some control shortcuts - for example; extended cursor movement in the text mode could be built into *Bank Street* to satisfy advanced users – but he feels strongly about keeping them as utility program default options.

'Adults get frustrated when they have to go back and forth between write and edit modes correcting text,' he explains. 'But we did that as a design feature, because we think kids really have to separate out conceptually writing from editing. When you write you should write, and, when you edit you should make a decision to do it.'

What else appeals? Above all the fact that the reverse side of the disk has on it an excellent interactive tutorial. That tutorial had us 'up and running' the program within half-an-hour and never once did we have to consult the manual. Then, on the Apple Version, the fact that the program and the tutorial recognises if the machine is a II+ or a IIe and adjusts itself accordingly. Finally, the price – at under $100 – is good value.

Bank Street Writer is a writer's tool. It isn't the only way to manipulate text, create revisions, or have fun with words; but it will make writing less arduous and with it more people will find themselves enjoying the process: the package does go a long way to earning its success.

Price and Source

Bank Street Writer is distributed in Australia by Imagineering, (02) 212 1411 and is available from retail stores for $98.95. Versions have been produced for the Apple II, II+ and IIe, Atari 400 and 800 and Commodore 64. All require 48k of RAM and one disk drive.

A version for schools is produced by Scholastic Inc, 730 Broadway, New York, NY 10003, USA. It includes three copies of the program disk, a 30-day guarantee and separate teacher and student manuals.

CALLING A HALT TO THE QUEUEING

TONY WESTBROOK EXPLAINS WHAT TO LOOK FOR IF YOU EVER DO DECIDE THAT ONE MICRO ISN'T ENOUGH.

All too often people thinking about buying a microcomputer for their business look no further than one machine. But it is worth taking a close look at your company before you buy anything. Do two book-keepers handle your accounts? Do you have more than one secretary? If you are in this situation, or if you are already watching the micro you bought last year being battered to death by warring factions from the accounts department, the warehouse and the typing pool, it may pay you to think about buying more than one micro.

Unfortunately this decision will plunge you into a morass of incomprehensible jargon. Some salesmen will try to stun you with the benefits of multi-user systems; others with the science of networks. In fact, as is often the case, one of these two methods of sharing the computer among several people is likely to be more suitable for some businesses than it is for others.

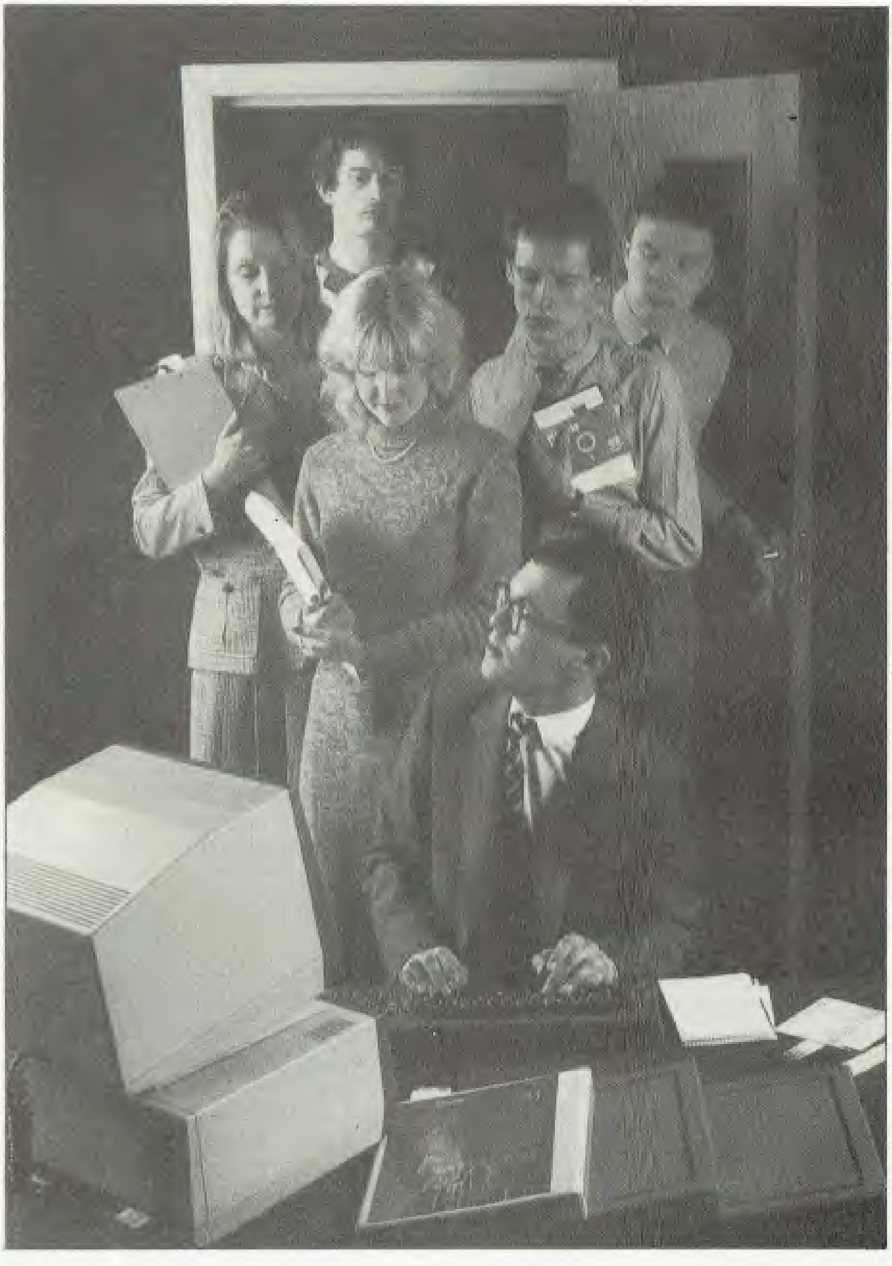
Multi-user systems

A multi-user microcomputer is a machine that uses a single microprocessor (a whole computer processor contained on one silicon chip) to distribute computing power to several users. In this respect it is the same as mini and mainframe computers, which use their more powerful central processing units to serve more than one user.

So that no one user monopolises the microprocessor for too long, a system known as time sharing is used. Time sharing allows each terminal connected to the microprocessor to use its computing power for a limited time. Each terminal gets a turn, and by giving each user just a fraction of a second, the effect is almost the same as if each user had their own microcomputer.

The number of users is of crucial importance with this kind of system. If 10 users share the system described above, there would be a one-second delay between each tenth-of-a-second burst of activity on a particular user's terminal. A practical result, often seen, is that when a screen half fills up with information, there is a significant pause before the rest is complete.

Improvements can be made by using faster, more powerful microprocessors. Better multi-user operating systems also help, since less time is wasted on the micro's 'housekeeping' routines. Another way of speeding things up is to give each user their own dedicated microprocessor, and have a central microprocessor in control of all operations. In a multi-user micro this will mean plugging a board into the back of the machine with this dedicated processor on it.



Networks

Some networks are very similar to this kind of multi-user machine, because they too have a central controlling microprocessor, and remote processors running independently. In a network, though, these remote processors are ordinary microcomputers (and maybe minis and mainframes as well), and even the controller may just be another micro running special software.

In networks the computing power is kept with the user. A 'network' of cables connects the individual micros, and users can communicate via these cables. The advantage of a network over a multi-user micro is that each machine connected to it can also work totally independently, so a failure of one micro does not stop everybody.

Networks are also popular as a way of sharing expensive peripherals like printers, hard disks and so on, and are ideal for electronic mail and other communication-type functions.

To make more sense of the huge range of systems on offer, we have set out some questions to ask yourself and your potential suppliers. These questions should help you begin to identify what kind of system is right for you.

1 How much money have you got to spend?

This is always a crucial question, and is certainly no less so here — it is perfectly possible to spend tens of thousands of dollars on networking systems.

Usually the cost of a single station multi-user micro is not much more than a single user one. Additional users need more workstations, and sometimes another card in the back of the machine. They also need the multi-user operating system. Prices typically range from $5,000 to $10,000 for the central micro (depending on processor, memory, disk options etc) and $1,000 tp $4,000 for additional workstations. Some companies sell the operating system as an integral part of the deal, others do not.

Network prices are extremely variable. A simple network can be as little as $1,000 for four users (not including the microcomputers of course). At the other end of the scale are networks with disk storage, and the flexibility to connect to mini and mainframe computers. These can cost as much as $100,000. This type of system is about 250 times faster than the first type, which makes such a huge price difference more understandable.

2 How many users will share the system?

If you are expecting your company to grow in the next five years, it is important to take account of the implications this has for the system that you choose.

The maximum workstations allowed on multi-user micros is usually about 10 or 12. Peripherals like printers, modems and so on are usually included in this number, so you must remember them when considering a machine's capacity.

Workstations are generally standard computer terminals connected to the main processor by an RS232 serial interface, and this interface limits the distance between workstations and processor to 75 metres.

Remember also that the more workstations connected, the longer it will take each to perform its tasks because of the time sharing technique used. If the multi-user machine has a separate processor for each terminal, this longer time will be less pronounced, but the controlling microprocessor will still have more work to do if there are extra users. The actual microprocessor used will also have a bearing on speed, and at the moment machines using the Motorola 68000 chip are among the fastest multi-user micros.

Networks offer the chance to connect many more users: anything from 16 upwards. The number of users may not affect data transmission rates, but this varies from system to system. Speeds for different systems vary from 9600 bits a second, right up to 2.5 million bits a second.

3 What factors affect the speed of the system?

Any micro-based system is limited by its processor, but this is of more importance in multi-user systems where one processor is working for everybody. The operating system used also has a bearing on speed since time wasted due to inefficiencies will be multiplied by the number of workstations connected. The speed of disk access can also hamper the overall system, particularly when users are working with different areas of the disk. Winchester hard disks are usually best for multi-user applications — both for speed and overall capacity.

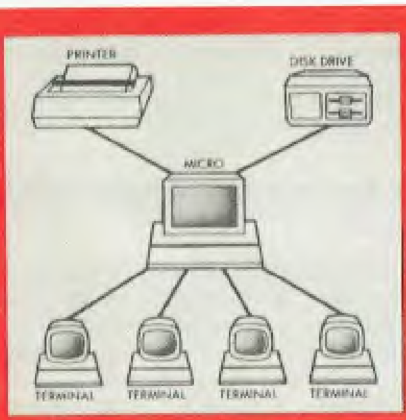
The factors influencing a network's speed are rather more complex. The type of network you choose will have a bearing on the speed. Networks break down into three types. A 'star' network has a central controller, and all micros on the network are connected to this controller. This system has several disadvantages. Two terminals next to each other still require separate cables to the central controller, and the more terminals there are, the slower the system becomes. This system is closest to the multi-user machine. Star networks tend to be fairly slow in their data transfer rate.

A 'bus' network solves these problems by connecting all the micros to a single cable. A message from a micro connected to the network (node) is available to any other node on the network. Obviously there will be times when two or more micros try to send a message at the same time, and so a 'collision detection' routine is included as part of the software on each micro. This routine instructs the micro to try again, and by programming each machine to retry at slightly different intervals, the collision can hopefully be avoided the second time around. The speed of this kind of system remains constant until the quantity of traffic on the 'bus' starts to increase the number of collisions.

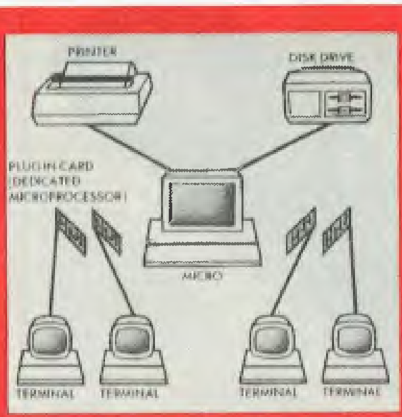
The third system is the 'ring' network which connects users in a large ring. An electronic 'token' is passed round the ring, and a micro can only transmit data if it has the 'token'. The data is then passed round the ring until it reaches its destination — identified by a code in the data. The speed of this kind of network depends on the rate at which data can be passed round the ring.

The ultimate performance of both ring and bus networks is highly dependent on the quality of the cable used. This factor also affects the cost of a particular system. The cheapest cable usually used is a 'twisted pair' which is just that — two wires twisted round each other. Another attraction of the twisted pair is the ease with which new connections can be made. Extra micros can be connected with minimum disruption.

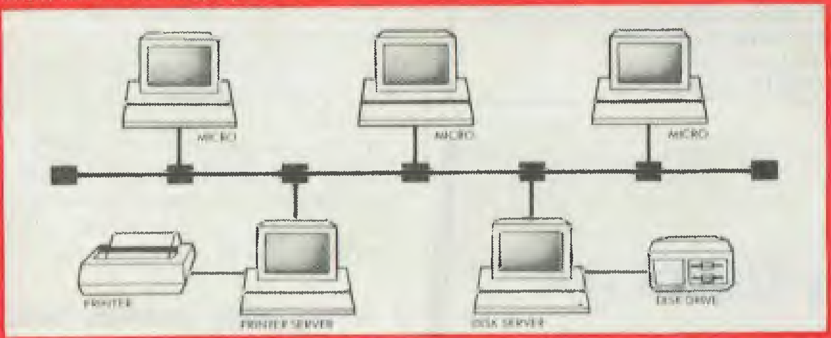
The alternative is the co-axial cable, which has an inner conductor surrounded by insulation and an outer conductor. This outer conductor isolates the inner one from outside interference. This means the co-axial cable can transmit data at much higher speeds, and is much less susceptible to data corruption. By using the co-axial cable that is made in large quantities to connect domestic TVs to their aerials, network makers can keep costs down. If the network you are considering uses co-axial cable, make sure it is this cheap domestic type.



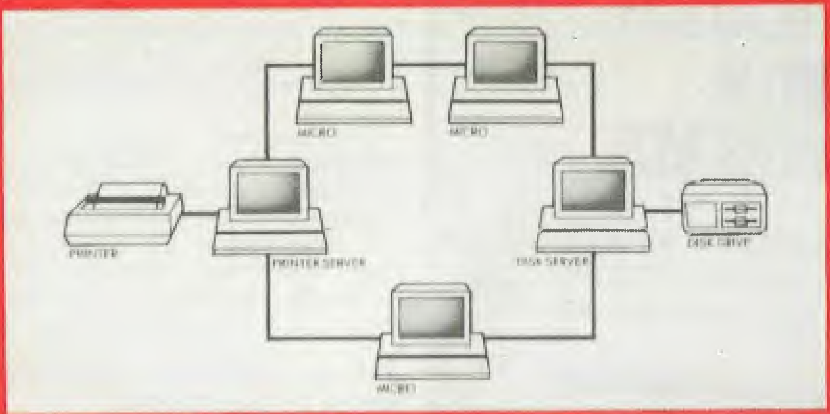
Multi user with single processor



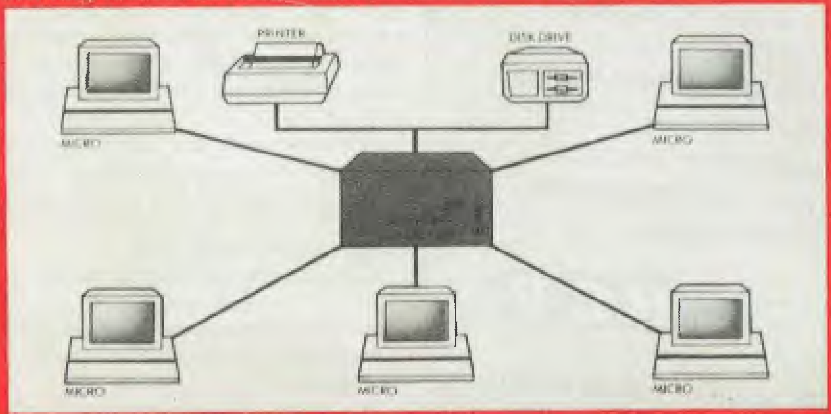
and with dedicated processors



A 'bus' network connects all the micros to a single cable



In a 'ring' network all the micros are connected in a large circle



In a 'star' network, all micros are connected to a central controller

4 What is the physical layout of your office or factory?

This will have great bearing on your final choice. Most multi-user machines have severe limits on the distance of individual workstations from the central processor. Networks also have limits, but the distances tend to be much greater. Getting round the problem is possible in both cases, but solutions usually come at a price.

The RS232 standard is limited to a few hundred feet without some kind of regeneration, and this limits the potential coverage of multi-user micros, and most star networks as well. The solution may be to use a modem and a Telecom phone line, but then there will be a severe speed penalty.

Networks using twisted pair cable can usually cope with 1,000-metre runs, and co-axial cable considerably more, but these distances depend on the transmission technique used.

5 What kind of software do you want to run on the system?

As always, the choice of software is of prime importance, and what you choose will limit your options.

Many multi-user machines allow you to run programs written for CP/M or MS-DOS operating systems as well, but you will have to assign disk space to these operating systems. Running these programs may mean other users are unable to use the machine while you are doing so.

A lot of software is now being written specifically for multi-user machines. Previously most software was of the modified single-user variety, and didn't make full use of the hardware. Multi-user micro software is particularly strong in the area of fully integrated systems, with accounting, stock control, word processing, spreadsheet and so on all in one modular package — you choose the modules you want, and they share common data. Usually, each manufacturer has a particular package to offer, and not much else.

The potential of networks for electronic mail and sharing expensive peripherals has been obvious for some time, so most networks offer this kind of software. And of course each micro on the network can run software as it would if it were operating alone. What is not quite as clear is whether the more integrated type of package seen on many multi-user systems will become available to network users. Part of the problem is the way most networks try to connect as many different types of micro together as possible — this seems a good idea, but makes it very hard to produce co-ordinated compatible soft-ware to run on the whole network.

6 Can I use the equipment I already have?

Unless the micro you already have is one that can be expanded to multi-user operation, then you'll probably have to start again, or think about a network.

Networks are extremely accommodating in this way. Some networks, particularly those of the star type, use ordinary RS232 connections and can connect many micros. Almost certainly there is a simple network which will work with your existing machine (or machines).

If you already have a .multi-user machine you might consider networking this with others in remote locations. In a lot of applications, this hybrid solution can offer the best of both worlds.

7 Is any other hardware besides the micros required?

For a multi-user system it will simply be a case of plugging extra terminals in, although an extra board may be required in the machine.

The hardware requirements for networking systems are more complex. If the system is a star network, there will be a central controller, and this may have disk storage (usually a Winchester), and maybe even a tape streamer to back-up the disk. Bus and ring systems may have a dedicated box to handle disk files — a file 'server' — or they may use one of the micros to control a special disk drive and perform the same function.

Once you have answered these questions, it may be a little easier to see which system suits your particular application. Most networks at the cheaper end of the scale, including some ring networks, are mainly aimed at the user who wants to share peripherals and not much else. Anything else is likely to be in the price bracket which you will normally find is reserved for large corporations or pop stars.

One possible solution for the small to medium business could be to combine the convenience of a network designed to transfer files with two or three multi-user machines.

Whatever the system chosen, it will be welcomed by all if it gets rid of the queue at the keyboard.

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QUANTUM MECHANICS

Geof Wheelwright and Ian Scales give you the first ever preview of Sinclair's innovative new micro.

Once a year, for the past four years, Sir Clive Sinclair has stunned the computer world by introducing a computer product that breaks new ground in both price and technology. With his new QL micro, he has done it again.

It seems that Sir Clive and Sinclair Research have an uncanny ability to judge the current mindset of computer purchasers and apply that judgement to making lots of computers and lots of money. When people had little or no idea of what a home computer was or what it could do, he supplied them with the 1k ZX-80 and ZX-81 machines. When those same people saw the power and desirability of more memory and colour in a home computer, he brought out the Spectrum in 16 and 48k versions.

Now Sir Clive has seen the growing demand for business-type computers in the $1,000 to $3,000 range. Sinclair's competitors have responded by building cheap versions of standard CP/M systems or the IBM PC.

Sir Clive's approach to the market, as always, is both unconventional and brilliant. With the new QL micro (the Australian price is expected to be around $1,000) he has literally leap-frogged beyond CP/M, MS-DOS and IBM-compatibility, and accomplished the Quantum Leap that is claimed in the name of this new machine.

Not only has he jumped from an 8-bit processor to a 32-bit, but he has also incorporated a new operating system (Q-DOS) and an impressive multi-tasking capability in a machine that has two to three times the RAM of any of its nearest price competitors.

Presentation

The machine examined in this review was a pilot model and didn't include the packaging that will be standard with the QL. However, you can expect the usual Sinclair styrofoam packing to be wrapped around the power supply, computer manual, software and Microdrive cartridges that are included with the price of this machine.

The manual itself is a standard three-ring binder with pages that can be inserted or removed easily for updates to the built-in software and additions to the technical information.

Psion has written four software packages for Sinclair that are all included in the price of the QL:

QL Quill – a full 80-column word processor with on-screen display of underlining, page breaks and different typefaces.

QL Abacus – a VisiCalc-style spreadsheet with the ability to do 'what if?' financial modelling.

QL Archive – a database package that uses its own design language to create your own filing system.

QL Easel – a business graphics program that will do lines, shaded curves, histograms, stacked bar charts or pie charts. It can also access information collected in QL Abacus as each of the programs can 'import' information from the others.

These programs come supplied on Microdrive in their own plastic wallet – this opens like a book with a hole for each of the cartridges containing the programs.

Because two Microdrives come built-into the machine, Sinclair also supplies four blank Microdrive cartridges – the minimum you'll need to get started using the QL.

The QL itself is long, light and narrow – although it is probably shorter than the keyboard of an IBM PC and not even as tall as a Commodore 64. Sinclair has always been good at making its products as small as they can be.

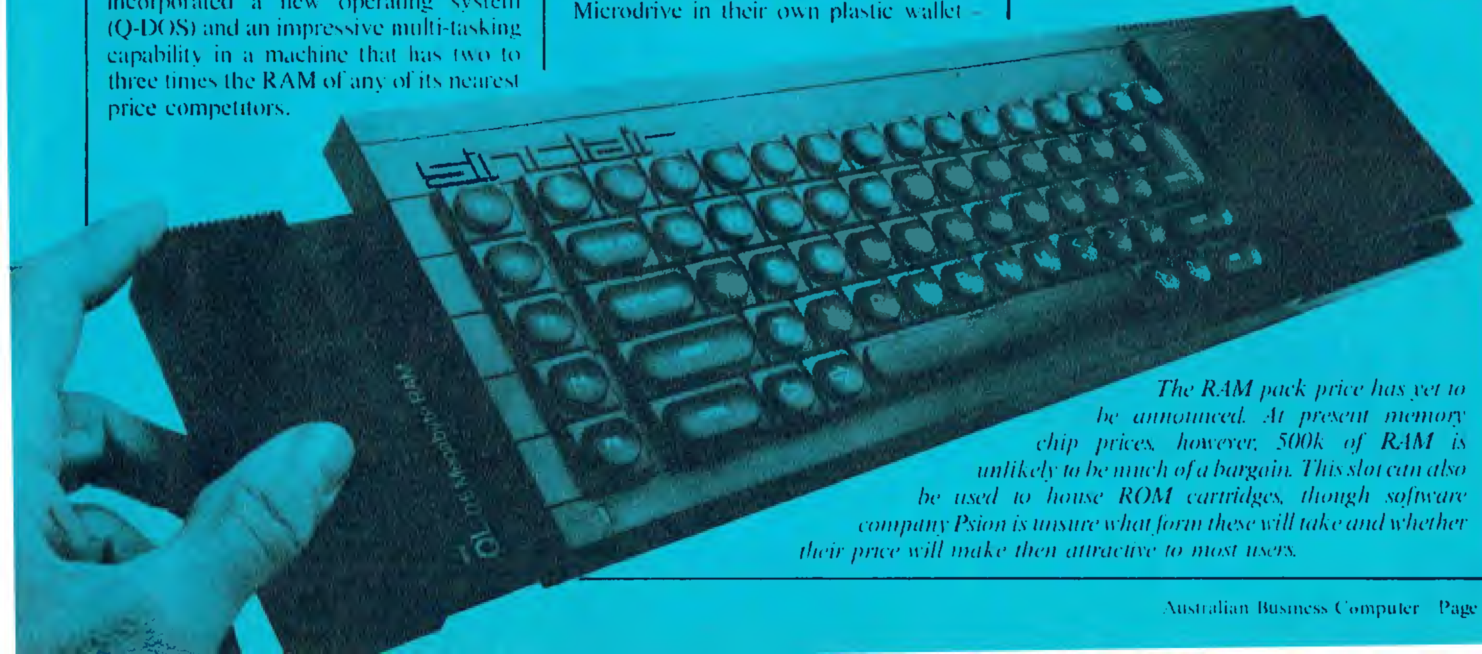
The company should have no problem in shipping the machines by mail-order (and that will be the only way you can buy them until production speeds up and Sinclair services international markets.

Documentation

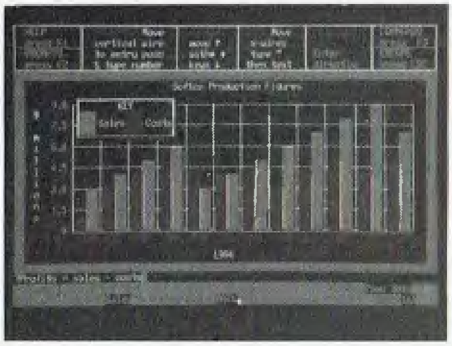
Gone are the book-type user-guides of the ZX81 and Spectrum. The QL documentation is firmly 'business' like, with a large-format ring-binder and protruding chapter break tabs.

This format makes sense – although not particularly easy to leaf through quickly it indicates Sinclair's commitment to software updates and modifications as the chapters are individually numbered.

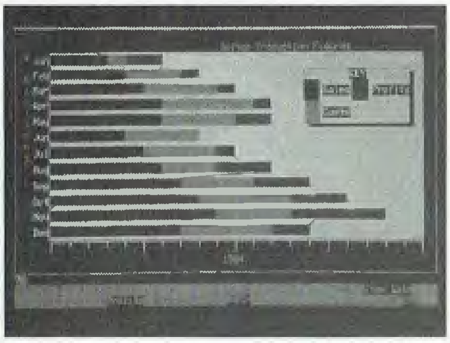
Our documentation was provisional only. The all-important Beginner's Guide section had yet to be completed and included. The bulk of the information, of



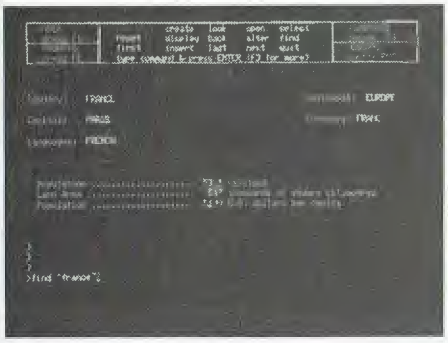
The RAM pack price has yet to be announced. At present memory chip prices, however, 500k of RAM is unlikely to be much of a bargain. This slot can also be used to house ROM cartridges, though software company Psion is unsure what form these will take and whether their price will make then attractive to most users.



Easel histogram display — the formats are easily set up.



Or you can lay the graphics on their side.

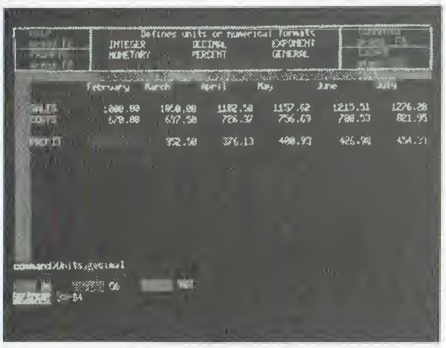


```
create  look   open  select
display back   alter find
insert  last   next  quit
(type command & press ENTER (F3 for more)

FRANCE                    EUROPE
PARIS                     FRANC
FRENCH

>find "france"
```

QL Archive language allows you to design your own formats.



```
Defines units or numerical formats
INTEGER    DECIMAL    EXPONENT
MONETARY   PERCENT    GENERAL

        February  March    April    May      June     July
SALES   1000.00   1050.00  1102.50  1157.62  1215.51  1276.28
COSTS    670.00    697.50   726.32   756.69   788.53   821.95

PROFIT             352.50   376.13   400.93   426.98   454.33

command>Units,decimal
```

QL Abacus uses the traditional spreadsheet layout.

Aesthetically pleasing and very light, the entire machine is actually smaller than some detatchable keyboards.

course, is devoted to the four application packages. There is also a considerable section on the SuperBasic Keywords that will be an obvious target for expansion and elaboration as a number of important words and concepts – notably the use of sound, DEFINITONS and PROCEDURES – are given quite short shrift.

Construction

Pilot and prototype models of computers are not known for their hardiness and strength, but if the QL's prototype is anything to go by it should considerably reduce Sinclair's sometimes high return rate on machines. Not only does the QL seem sturdy and well-built, but it has several hardware design features that should keep it from getting damaged.

Firstly, the QL has abandoned the perennial Sinclair bare-board expansion bus in favour of a set of nice, clean recessed plugs at the back of the machine, a neat plug-in for Microdrive extensions of the right-hand side and a proper cartridge plug-in port for ROM and RAM board expansion on the left-hand side.

Secondly, the QL doesn't come with any games software – and even if lots are quickly written for it, those games will likely make use of the joysticks which can be plugged into the QL – rather than forcing certain keys to undergo torture as 'fire' buttons in Space Invader games. Although it has a full-travel typewriter keyboard, there is also a membrane underneath it that protects the guts of the machine from invading particles.

In fact, Sinclair makes the rather fantastic claim that the QL can absorb caffeine without too many adverse effects. 'A membrane beneath the keyboard protects the machine from dust

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(and coffee!),' claims the QL publicity. Needless to say, we didn't test this feature of the machine.

And thirdly, although Sinclair has not yet brought itself to spend the few extra cents necessary to include an on/off switch in its latest machine, it has opted for a proper recessed reset button on the right-hand side.

In addition to this, a reset can also be effected from the keyboard by pressing the CTRL, ALT and space bar keys in unison. The keys are sufficiently far apart so that you're not likely to press them all at once by accident.

Keyboard

The QL keyboard is "ergonomically-designed". In many ways it's just a standard QWERTY job, but it has a few nice touches that should put it a notch above most of the others in its price range.

The SHIFT keys are where you would expect them to be – none of this IBM confusion with a backlash honing in where your SHIFT should be. Sinclair has also taken care to differentiate between CAPS LOCK and SHIFT, so that if you're doing some upper-case programming in SuperBasic your 4's don't get turned into $ signs by the CAPS LOCK shifting the keys – the CAPS LOCK gives you only upper-case characters on alphabetic keys.

The function keys are nicely separated from thee main QWERTY keyboard so you don't hit them by mistake when you're quickly keying in some numbers on the top row of keys. The keys also give off the 'positive audio feedback' or click-click sound that makes life much easier for touch typists.

Finally, the QL has a lovely big 'backwards L-shaped' ENTER key so you don't have to hunt around trying to find what is undeniably the most oft-used key in programming and probably the most popular key in other applications.

Among the disadvantages is the rather odd inclusion of a copyright sign as the shifted value for the ESCAPE key and the non-standard arrangement of the cursor keys on either side of the space bar.

But these are quibbles. It may actually turn out to be easier to move a cursor around with the left-right arrows on one side of the space bar and up-down on the other. In fact, many games for micros already work that way with the Z and X keys taking the roles of left-right keys and the ' and ? keys acting as up and down.

The inclusion of 'legs' to adjust the tilt of the keyboard should also make it slightly easier to use than many standard keyboards, which cause you to strain your wrists trying to maintain the right attitude over the keyboard.

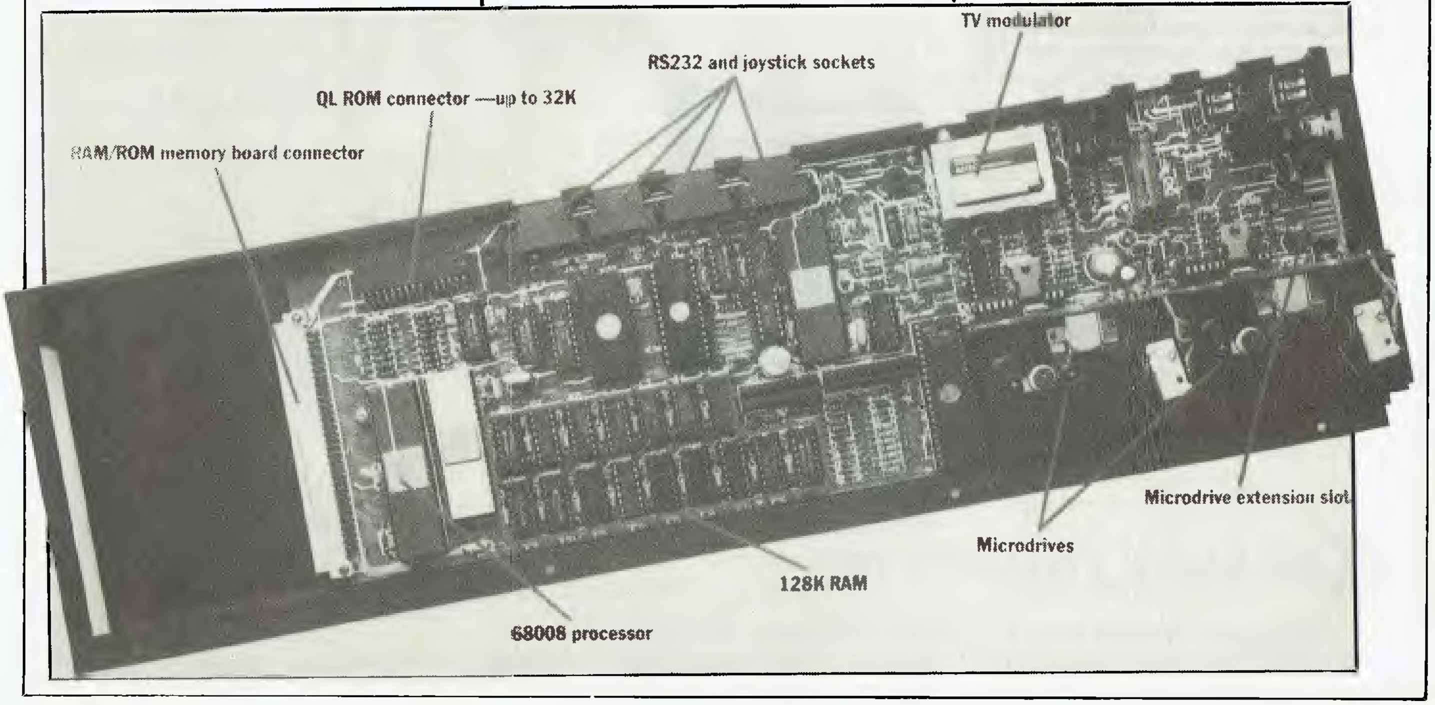
Storage

Storage on the QL is provided by a brace of Sinclair Microdrives. These devices were first introduced in mid-1982 as an add-on for the Spectrum. The Microdrive uses a very thin 200-inch length of magnetic tape on an endless loop. The tape resides on a single spool and is fed past a magnetic head at 30 inches per second and being wound back on the outside of it again. Once it has completed the full length of the tape, in 7.5 seconds, it's back to the start and ready to go again.

The cartridges are tiny but cost a rather hefty $8.00 each. The drives are situated unobtrusively to the right of the keyboard and the cartridges are inserted just under the computer's skin. Further Microdrives can be chained 'a la Spectrum' from an expansion bus. The Spectrum Microdrives are not compatible with the QL.

The QL Microdrives have been upgraded from their original Spectrum versions. The capacity has been increased to a minimum 100k (the Spectrum's minimum was 85k). It's also pleasing to see that the 'Sinclair' has been simplified. To get a cartridge catalogue it's enough to type CAT MDV1 to get a list of files from Drive 1.

Sinclair has dispensed with the stingy keyboards of the ZX days. This one still uses a touch-sensitive membrane, but the keys mimic full-travel and the QL registers a 'click' to provide some feedback.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The Microdrives are easily accessible — as long as you're right handed.

The Microdrive is a serial device which mimics actual random access. Its 100k capacity is divided into 255 sectors of 512 bytes. As with a disk drive, you simply give it a command to find a named file and it whizzes through the length of the tape and transfers the relevant sectors to the memory as it finds them. In theory, the average access time should be half the tape's loop time, though after a long period of activity when you're changing file lengths, adding new files and deleting files, the sectors for each file tend to become scattered throughout the length of the tape. Unless you're prepared to conscientiously 'housekeep', the cartridges' access time is going to be closer to 7 seconds.

The Microdrives are the key to the success of the QL. The alternative of conventional floppy disk drive storage would have doubled the machine's price. Although the Microdrives represent a considerable innovation they cannot be considered floppy disk workalikes. Instead they provide an alternative to disk usage.

When RAM memory becomes cheap enough, it will be memory reliant systems like the 68000-based QL which can take advantage of the changed ground-rules. Storage access speed will become less of a problem with 640k of memory available in RAM. Although the price of the 500k RAM pack has yet to be announced, it may well be round the $300 mark. In the long run we can expect the cost of memory to tumble even further. When this happens you will be able to load up all the information you are likely to require at the start of a session. The files should be easily accessible – quicker even than a winchester drive.

With the 500k RAM upgrade it would be possible to have several programs

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sitting in memory until needed. It would also be possible to have several hundred k of files all loaded up and ready to access.

Sinclair is also talking about the addition of winchester disk drives, though it has no plans to produce disk drives itself. It will undoubtedly be up to third parties.

The QL will undoubtedly be criticised on the grounds that the Microdrives provide neither the speed, capacity nor reliability of disk drives, therefore disqualifying the product as a serious business machine.

This criticism would miss the point. We believe the QL will succeed precisely because it has been designed to use mass internal RAM storage. For most business applications it will prove a faster and more flexible tool than any existing business micro costing four times its price.

Software

On its own the QL would have been an instant success. With four programs bundled in the purchase price it's a winner. It is no exaggeration to say that the programs alone would, under normal circumstances, be worth the QL's $1,000 price tag.

But, of course, Sinclair products never represent normal circumstances. In this country at least, software prices for business micros must come down if the machines are to compete with the QL. This price move has indeed been a long time coming – it is cheap and friendly software, more than any other factor, which will eventually sort the men from the boys as the long-awaited 'shakeout' occurs.

Once you've written a software package it costs next to nothing to duplicate it – what better way to enhance a mass-produced hardware product than to give away software with it?

The key to the Sinclair operating system, QDOS, is the 'multi-tasking' capability. Multi-tasking is where you can have several programs running simultaneously. The term multi-tasking is a much used and abused term. All micros 'multi-task' to some extent. There is always a program running to display the screen and another program simultaneously reading the keyboard while the application program is doing its stuff.

The number of tasks a micro can do at the one time relates directly to how quickly it can process information. As the 68000 chip is a *very* powerful device it's possible for it to be doing many different things at one time without the user noticing any great reduction in speed – the processor simply executes a tiny bit of one program, then a tiny bit of the next and so on, fast enough to make it appear that it's all happening at once.

So when you have a very powerful processor you can design its software to take advantage of this capability. The four Psion packages (which we will look at in greater depth when the QL is commercially available in Australia – towards the end of '84 – and a full Benchtest is conducted) use multi-tasking in the form of windows. In windowing you can have two or more programs running and being displayed in separate parts of the screen at once.

Add to this the facility to transfer data from one application program to another and you can see the potential. The Psion packages enable you to display a page from the database or spreadsheet package while preparing a document on the word processor, for instance.

And then there's games – the abilities of the QL here are quite staggering. You

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can have as many separate graphics programs simultaneously running in different parts of the screen as you like.

According to Sir Clive, the company is unsure which way users will take the machine – Sinclair was taken by surprise at the games direction of the Spectrum and is prepared to be surprised again at what applications people will find for the QL.

The QL has been designed to offer the ultimate in choices in this regard – there are joystick ports, a games cartridge port, Microdrives, RAM/RAM expansion slot – enough hardware flexibility to assure the software applications which make use of it will go any way but down.

Forecast

It is very difficult not to be carried away by the QL. Unless it proves to have very serious faults or drawbacks it's bound to be a huge success. Sinclair has identified the demand to launch another mass-market computer, where volume sales can keep down cost and low cost can assure volume sales.

Specifications

Processor	Motorola 68008
RAM	128k (expandable to 640k)
ROM	32K
Text Screen	Various modes – up to 85 x 25 Monitor; TV 40 to 60
Graphics Screen	512 x 256 pixels (4 colour) – 256 x 256 pixels (8 colour).
Keyboard	Full moving 65-key qwerty, 5 function keys, 4 cursor keys.
Interfaces	Two serial RS 232 interfaces, Microdrive expansion port, ROM cartridge port, Local area network, 2 Joystick ports, RGB Monitor and interfaces.
Storage	Twin QL Microdrives, 100k each – transfer rate, 15k per sec.
OS/Language	QDOS, Sinclair SuperBasic.

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ROUND AND ROUND IN CIRCLES

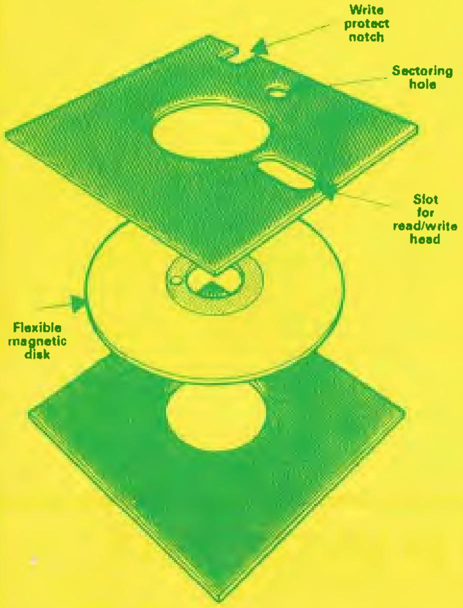
Home computer enthusiasts lust after disk drives and business users couldn't manage without them. This is because they offer a convenient way of storing data. And after all, handling data is what computing is all about.

Having a fancy microprocessor or lots of memory is not enough to make a microcomputer useful. What is needed is some way of giving it all the programs and data it requires to do its task(s).

Most home users make do with cassette recorders, but at best this is a compromise. The cassette recorder was never designed to work with computers – its only merit is its low cost.

Disk drives, on the other hand, have been designed for computers. They offer features more appropriate, such as large capacities, fast access (a fraction of a second rather than minutes) ease of use and reliability.

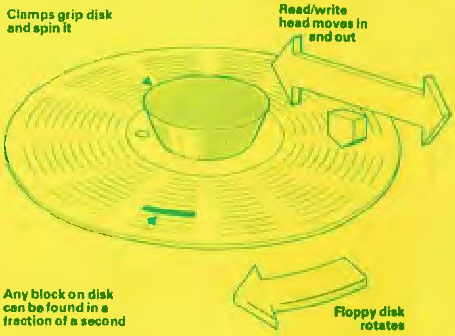
Disk drives use the same principle of magnetic recording to store data as do cassette recorders. Instead of using long thin tapes of magnetic material, disk drives use (you've guessed it!) disks of magnetic material.



A disk is the best shape because it has a fairly large surface area (to store lots of data) and yet part of the disk can be found quickly. A tape, in contrast, takes a long time to wind through from one end to another.

JIM LENNOX EXPLAINS HOW THOSE LITTLE BITS OF PLASTIC REVOLUTIONISE YOUR SYSTEM

All cheap disk drives are of the type known as 'floppy' disk drives. This is because they use disks made of a thin layer of polyester coated with magnetic oxide. This is much like magnetic tape in being flexible, but it sits inside a jacket which protects it. This isn't flexible, so it is a bad idea to try bending a 'floppy' disk.


Clamps grip disk and spin it
Read/write head moves in and out
Any block on disk can be found in a fraction of a second
Floppy disk rotates

The disk drive spins the disk at about 300 revolutions a minute. A read/write head moves in and out from the centre of the disk to its edge and it also moves quickly. This means that any part of the disk can be brought under the read/write head in a fraction of a second.

When a floppy disk is inserted in a disk drive, it is gripped by a pair of rings which clamp its centre. The rings are driven by an electric motor to spin the disk.

As the disk spins it rubs against its protective jacket. The jacket is coated with a special low friction substance. Even so there is bound to be some wear on the disk, and they obviously do not last for ever. Some brands are guaranteed to last, but it is still essential to make copies of all data just to be safe. A disk costs a few dollars, lost data could cost thousands.

The first type of floppy disk to be developed was 8 in. in diameter. These spin continuously when the disk is in the drive. Later a cheaper alternative with disks only 5¼ in wide (often called a 'minifloppy') became popular. These disks spin only when data is being read or written, thus reducing wear. They are also a little slower because the computer has to wait a second or so for the disk to start spinning.

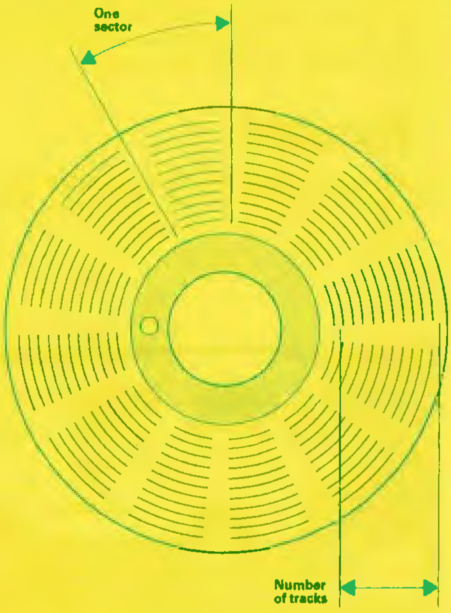
Even smaller disks (microfloppy disks) are just becoming available and there is a running battle to see which of several competing standards will become the norm. The choice is between disks 3, 3¼ and 3½in wide.

All types of disk manage to cram large amounts of data on to their surface. This is all in the form of ones and zeros represented by tiny points magnetised in one direction or another. The operation is far more efficient than with cassette tapes.

Data has to be organised carefully so that any item can be found. It is stored in a number of concentric rings (rather than a single spiral of an LP record) which are known as 'tracks'. Each track is a little like a short length of audio tape bent into a circle. Most 5¼in disks have 40 or 80 such tracks.

Disks are also divided into 'sectors'. These are segments which divide the disk up in much the same way as a pie is cut up, the edges of each sector being a radius of the disk.

The sectors run at right angles to the tracks, so the disk is split into a large



number of small 'blocks' of data. Each block will hold only a few hundred bytes of data (1000 bytes equals 1k of memory).

To find a particular block of data the read/write head is moved in or out of the appropriate track. It then waits for the spinning of the disk to bring the block to the head. Moving the head and waiting for the data to come around may take a fifth of a second or so, but once it is found it is read at high speed.

To find a data block the drive has to be able to tell where each sector starts. In the old days this was done by having an actual hole through the disk to mark the start of each sector. This was known as hard-sectoring and it produced a ring of small holes near the centre of the disk.

Nowadays, what is called 'soft sectoring' is used. Here there is only one hole through the disk and the sectoring information is recorded on the disk's magnetic surface in just the same way as ordinary data. This allows the number of sectors to be altered.

This is because different computers use different numbers of sectors. Soft-sectoring allows the disk makers to produce one brand of disks that are suitable for many different computers.

Users need never worry about hard or soft-sectoring because it should never affect them. Much more relevant is the way each make of computer tends to use a different number of tracks and sectors for its disks, producing the annoying situation where a disk produced on one computer cannot be read by another type of computer.

The main reason for the different combinations of tracks and sectors (each combination is known as a 'format') is that they give different storage capacities. Atari disk drives, for example, manage to store only 88k on a 5¼in disk. A Sirius disk drive can store over 13 times as much (1.2 Mb) on the same size of disk.

Storage Values

Disk drives that can cram lots of data on to a 5¼in disk obviously cost more than those that can't. This is the real reason why disk drive capacities vary. The Sirius uses particularly complicated drives which actually vary the speed of the disk depending on which track is being used. This allows more data to be stored on the longer outside tracks than on the tracks near the centre of the disk.

Top quality disk drives need top quality floppy disks and these can cost two or three times as much as the low capacity ones. Disks which can hold a lot of data are often called double or even quad-density disks.

Some disk drives record data on only the top side of the floppy disk while others use both sides, giving a bigger capacity. These are known as double and single-sided disks and drives.

All types of floppy disks have to have their 'format' of tracks and sectors 'marked' on to them before they need to be used. These 'marks' are made magnetically, in just the same way as data is stored, and are essential for the drive to find its way around the data stored on the disk.

Putting these marks on a blank disk is called formatting and is rather like printing lines on writing paper before it is used.

Computer companies often quote theoretical storage values for their disk drives before they are formatted. This is all very interesting but anyone thinking of buying the machines should find out what the formatted capacity is before they make any decisions. The format tracks can use 30% or more of the original capacity, so a 400k drive becomes a 280k drive.

Putting the format on a blank disks is one of the jobs done by something called a 'disk operating system'. This is a program (itself held on disk) which is loaded into the computer and then takes over control of the way data is arranged on disk, among other things.

The operating system keeps a record of all files (that is lumps of data) stored on each disk. It does this by setting aside a few blocks on the disk to store an index. This will hold the names of all files and details of which they are saved on the disk.

When a program asks for a particular file from disk, the operating system will read the whole of the disk's index. When it finds the file name, there will also be a number to say where the file is kept on disk. The operating system can then read the file itself.

Whenever a new file is added to the disk, a new entry is put in the index. The operating system should make sure that any new files do not destroy existing files.

A look through the advertisements in any micro magazine will quickly reveal that not all micros can use disk drives. They first need a piece of hardware called a disk controller and the disk operating system, which is a piece of software. It is often not worth the cost of developing these for cheap micros.

The disk controller is the 'intelligent' part of the disk system. It looks after the timings for controlling the disk and takes the information off the disk in blocks and then transfers it into the computer's memory.

Most units can control more than one disk drive.

Disk drives may seem daunting to new users, but they are easy to use once you have grown used to them, and undoubtedly perform far better than cassette tapes.

The prices of all computing equipment is falling so fast that more and more people can afford floppy disks, which has to be good news. They really are a prerequisite for using a micro in business.

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MEET THE MACINTOSH

No, we have not stooped to reviewing raincoats, we just let Ian Scales loose on Apple's latest progeny.

Some new micros offer little more than a drop in price, or a slightly novel facility: not many make you think you're witnessing the cutting edge of computer technology.

But then, very rarely, you know you're seeing something which represents a big step forward.

Such was the first impression of Apple's Macintosh (nothing to do with winter apparel, a Macintosh is a strain of Apple). Apple is hoping to see the Mac repeat the success of the Apple II, but the new machine is no 6502-based upgrade along the lines of the Super IIe. Instead it's a downgrade of the much-acclaimed Lisa, complete with a full 16-bit 68000 processor, 128k of RAM and 64k of ROM.

Like the II it will make extensive use of third party software and peripherals, but it slots into what Apple terms its Lisa family of products.

In many ways the Mac is the antithesis of the Apple II which was very much a 'configure it yourself' system requiring its users to get inside the case and add cards to incorporate such features as 80 columns of text, printer and disk drive interfaces, and so on.

The Mac has been designed as an unpack-and-use-it system. It's an integrated unit with a single micro floppy drive, monochrome screen, detachable keyboard and mouse and it packs into a reasonably portable bag.

But the real feature of the Mac is not what it is, although its hardware specifications are impressive, but the way the software presents itself.

Early in 1983 Apple released the Lisa. The Lisa is an expensive machine with a megabyte of RAM, a hard disk, 68000 processor and two subsidiary processors. Apple's idea was to use the power available through a 16-bit processor to substantially enhance, not so much the sort of processing which could be carried out, but the power of the user interface.

The Apple approach takes the reasonable view that users want to take a computer home or into the office, plug it in and start working. With the present crop of (non-Apple) operating systems and application programs this is not easily achieved. Although the average application program is becoming 'friendlier' to use by incorporating more menus, better documentation, and more consistent procedures, there is still a long way to go. The basic problem is that computer A is designed to use operating system B or C which in turn run application programs from various companies.

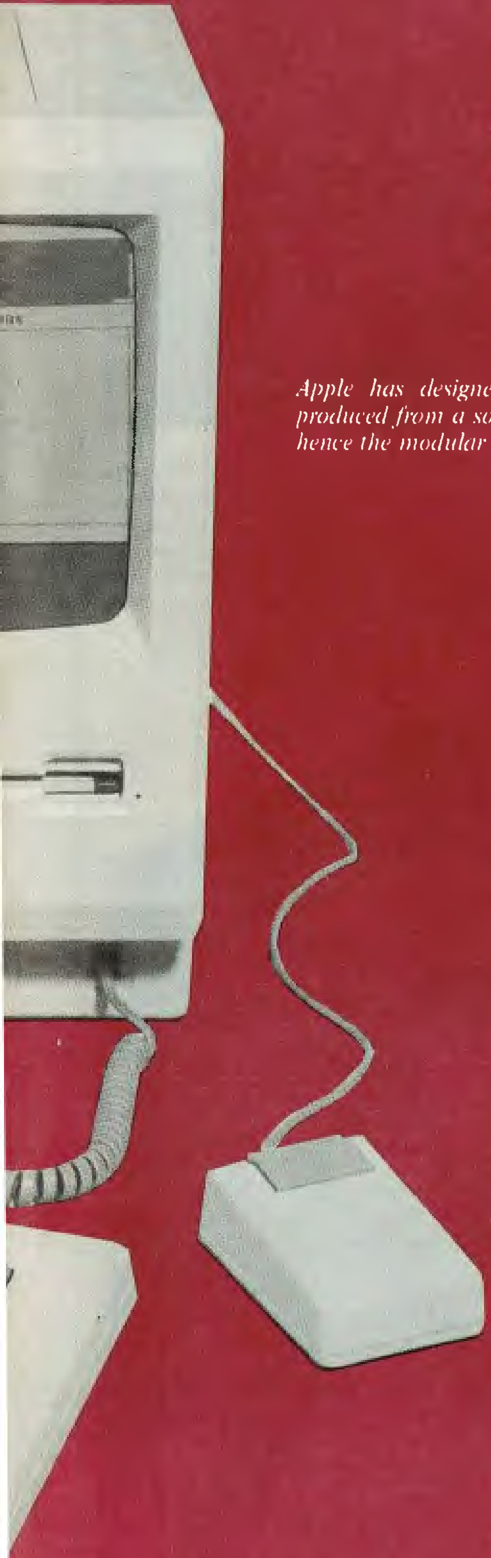
Because of this diversity among software suppliers there are always distinct differences in the way each application program interacts with the user.

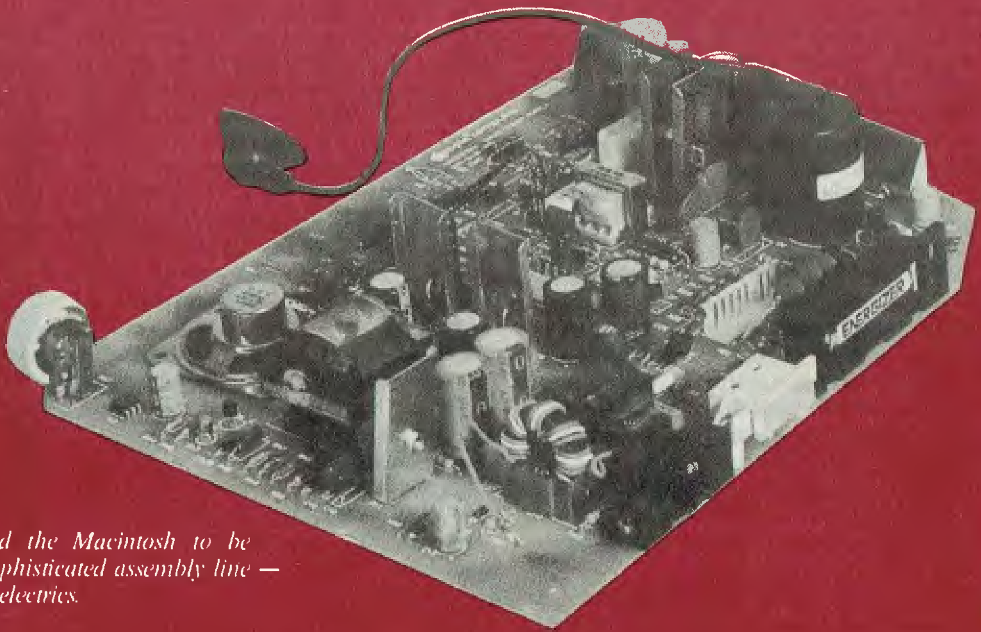
Every time you use a package you have to sit down and spend several hours learning a new set of procedures, control codes and function codes. They're not called codes for nothing.

How much easier it would be if the programs run on a computer used a consistent method of presenting themselves. When I use a package (it's usually a word processing program), I construct an imaginary model of what's happening to the information as I manipulate it around the system.

For instance I subconciously understand the scrolling function as just that — as the text is scrolled down the screen I have the image of it rolling up at the bottom and unfurling again when I need it.

I find it's crucial to have a mental model of what's happening with the files — a system which mysteriously starts mucking





Apple has designed the Macintosh to be produced from a sophisticated assembly line — hence the modular electrics.

about with intermediate swap files without telling you what it's doing is most unsettling. It takes a lot of time to understand a process like this and have a model mapped out in your mind.

The problem would be part-solved if applications programs used a common set of procedures — dedicated function keys with overlays for each separate application is one popular method as an alternative to a fairly meaningless clutch of control codes which must be learnt by rote.

Apple has taken the 'friendly' approach a step further. What most new computer users are used to is paper technology. They understand information and its storage and organisation in terms of pieces of paper, folders, rubbers, and pencils. The setting for these storage media and tools is usually a desk.

Like Lisa, the Macintosh presents material on the screen just as if it were on the top of a desk. The Mac makes full use of a mouse. The mouse is a hand-held device used to position the cursor on the screen by means of a ball arrangement. As it is drawn across a flat surface, the ball rotates and the cursor is sent in the appropriate direction.

The Mac mouse also has a single button — so you move the cursor to an appropriate icon, then press the button to cause whatever function you're after at the time. The icons are small representations of such things as waste-paper baskets, pencils, and so on. In some cases words are used instead of images.

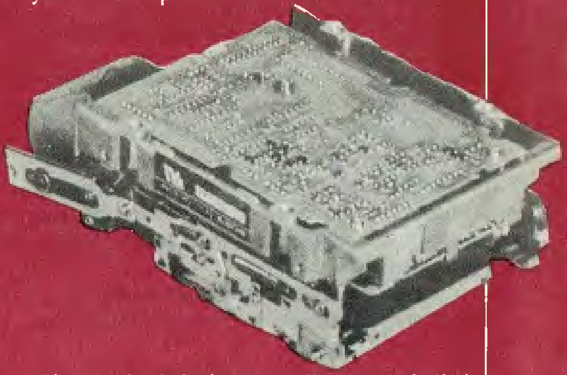
Getting started

At the pre-testing of the Mac, I was able to use the standard Mac word processor, Mac-Write. A session at the computer goes something like this.

The first thing is to load up the application program — nothing unusual here: you simply slide the microfloppy into the single disk drive and the appropriate code is automatically booted into the system. An interesting feature of the disk drive is its ability to spit the disk at you at the appropriate moment — at the end of the session or when a new data disk is required, for instance.

Once the whirring and clicking is over, the Mac's representation of a desk-top with various options in the form of icons and sheets of paper are displayed.

At this stage it's all mousework — you simply use the mouse to position the cursor over the appropriate icon and press the button. The whole process is fairly self-explanatory and easy to learn. But this initial process is even more fascinating if you watch a practised user.



The single disk-drive handles hard-shelled micro-floppies. As well as being extremely quiet it automatically ejects the cartridge.

The prime bugbear with the conventional type of 'friendly' user interface is that the 'hand-holding' way the program goes about coaching the user can become decidedly tedious once the procedures have been learnt.

Using a mouse you can become ultra-speedy within a relatively short space of time — zapping the cursor back and forth, pushing buttons and causing magical things to happen, and far quicker and easier than with a conventional arrangement.

The features of the word processing system are quite staggering. For instance, there is a line of words above the document — 'font' and 'style for instance. By putting the cursor over the word *font* and pressing the button you get a small document rolled down over your existing document, and it stays there as long as you keep the mouse button depressed.

You then move the cursor down the little document until you reach the specified font (the kind of type-face you require to appear on screen), release the mouse button and the existing text and everything you type on your document from this point on appears in that font and style.

The hardware

The Mac is designed as a take it home and turn it on, complete with a core of firmware, which controls the disk operating system and a lot of the routines necessary for the graphics representations *ie* the icons.

The object is to force software developers to provide a common user-interface. According to Apple the firmware is well tested and (as far as is known) bug-free. It would seem sensible, therefore, for anyone writing software to avoid re-inventing the wheel and include the tailor-made routines.

Apple plans to sell a lot of Macs: companies always say this, but this one is talking about an automated assembly line process capable of churning out a machine every 27 seconds. Apple has cause to be this optimistic. The Mac features stunning performance for its price.

It would be a mistake to view the Mac as a cheap Lisa — the problem with integrating software is that you have to provide a lot of power and memory for the system to do it (and do it quickly enough for it to be of any use). The Mac doesn't allow the user the luxury of concurrently available applications programs.

Apple makes no bones about the fact that the system still involves a fair amount of disk-swapping.

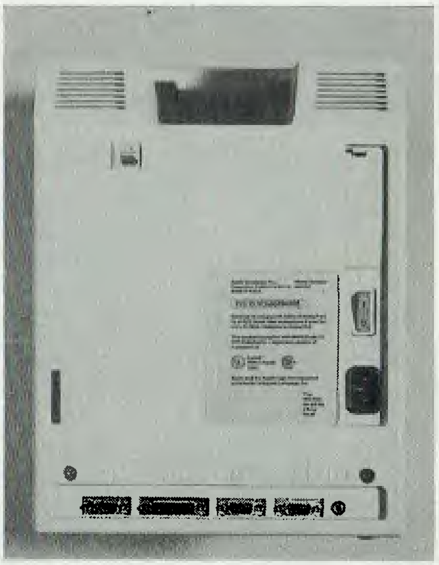
The machine has been designed so that it is only necessary to use one disk drive — a 3.5in Sony with 400k. This makes back-up problematical as it requires multiple swapping,but the machine eases the burden as far as possible by ejecting the disk at the appropriate moment and asking for the next.

It will be possible to add an extra drive, and other add-ons can be daisy-chained from the back of the machine through an Apple standard bus. It will be up to the third party peripheral suppliers to provide many of the extra goodies like a Centronics interface.

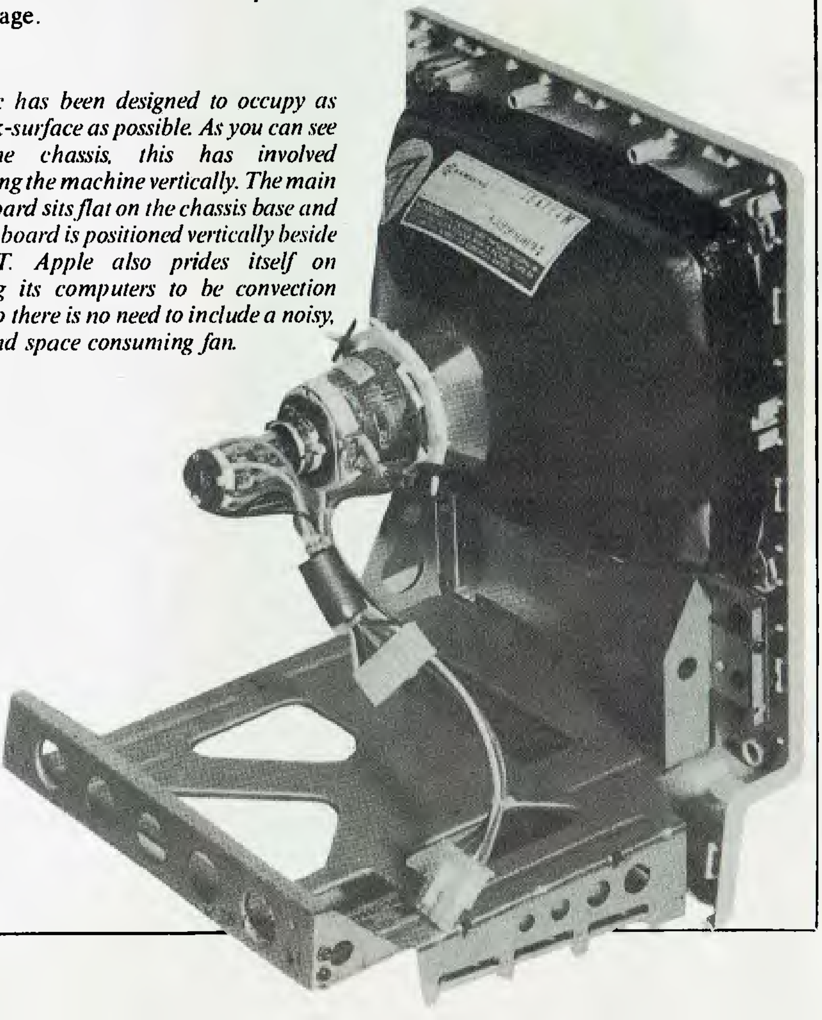
The Mac comes with two RS432 serial interfaces: one has been designated for use by the printer and the other will be for communications.

The dedicated printer seems a very impressive beast and is priced at around $750. It obviously has to be capable of commiting what appears on the screen to paper (fancy typefaces and graphics) and this it does at a good speed considering Apple's competitive pricing. The printer will be called the Imagewriter and is manufactured under licence in Taiwan to Apple's own design.

The Mac also has impressive on-screen graphics. By snatching the relevant icon with the mouse you can easily draw lines, do shading, lasso areas of graphics and integrate the results into the word processing package.

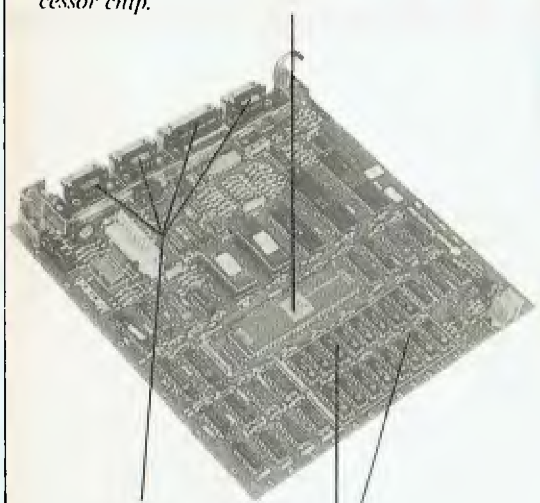


The rear of the machine provides all the I/O connections. From the left is the Mouse socket, an external disk drive interface, the RS 432 dedicated to communications, the second RS 432 dedicated to the printer. The vertical slot on the left side is for the bus connector.



The Mac has been designed to occupy as little desk-surface as possible. As you can see from the chassis, this has involved assembling the machine vertically. The main circuit board sits flat on the chassis base and the other board is positioned vertically beside the CRT. Apple also prides itself on designing its computers to be convection cooled, so there is no need to include a noisy, power and space consuming fan.

The main circuit board is dominated by the impressive-looking Motorola 68000 processor chip.



The interface circuitry and sockets are located at the rear.

Two banks of 64k RAM chips provide the necessary memory.

Apple has gone firmly for monochrome display so far in the 'Lisa range' — it keeps the price down, the resolution up and, as Apple rightly points out, the hard-copy output is usually photocopied in any case. Around the office, for instance, the drawing facilities of the Mac will make it ideal for composing forms.

The Mac is only one in a planned range of Lisa products and as such has been priced to occupy a certain slot. It would never do to have a cheaper product almost competing with the Lisa or whatever else Apple decides to take off the stocks and into the shops.

Apple fondly remembers the good old days of the Apple II when every West Coast programmer and his dongle was working on Apple II software. The big hope with the Mac is that the strategy to provide an open system together with a sophisticated and presumably slightly straight-jacketed operating system will not only prove attractive enough to convince software writers to create a diverse and inventive array of products to run under it, as they did with the Apple II, but that the end results will provide a reasonable anount of integration and a consistent user-interface. In effect, Apple hopes for the sophistication of Lisa coupled with the third party activity which produced Visi-Calc.

Verdict

On first appraisal it appears that Apple has come up with a winner. According to the company there are more than 100 software developers currently working on products. Apple hopes that it can control the end-user prices for applications programs at around the $120 mark. One of the companies currently beavering away is Microsoft which is redoing a version of Multiplan.

Apple is confident it will be able to keep a tight rein on the price of the Macintosh — the only price changes expected will be caused by fluctuations in currency rates.

Obviously, we hope to be able to give you a more detailed look at the Macintosh in action once the machine is available (which it will be by the time of publication). If anything can take on the IBM PC and its compatibles this machine can.

END

Specification

Price	around $3038 (excluding sales tax)
Processor	Motorola 68000
RAM	128k
ROM	64k
Text screen	dependent on fonts and type sizes
Graphics screen	512 x 342
Keyboard	58 keys plus mouse
Storage	1 3.5 inch drive
Interfaces	RS432 dedicated printer interface, RS432 communications, mouse connector, disk drive and bus connectors
Distributor	Apple Computer Australia, 37 Waterloo Road, North Ryde, 2113. Telephone (02) 888 5888.

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HARDWARE

ABC's introduction

A good overall definition of HARDWARE is "the bits of a computer system which you can see".

This definition would cover everything, from the wires connecting a printer to a *screen* or a *disk drive*. For ease of defining the general functionability, hardware can be grouped into four major categories:

- *Computational Devices*
- *Input Devices*
- *Output Devices*
- *Imput-Output Devices*

It is because of the advent of micro technology and the ease with which today's chips can be programmed to perform a myriad of functions, that any attempt at categorising HARDWARE is almost pointless. Even peripherals which have traditionally been thought of as "INPUT DEVICES" or "OUTPUT DEVICES", have so much local *intelligence* that they could be considered to be "COMPUTATIONAL DEVICES". For the sake of expediency a more conservative viewpoint will be taken within these group definitions with the exception of "COMPUTATIONAL DEVICES" as this area of common confusion bears clarification.

This group of hardware encompasses all those devices which receive some sort of *input* from another device, and performs a pre-determined function dependent upon the input. Any device which behaves in this fashion is in fact a *computer* in its own right. It is important to realise that it is not only the *central processor,* the main computational device, that can be *programmed.* Even printers, which are essentially output devices, have a programmable device inside them. This is necessary to convert the electrical impulses the printer receives. This part of the printer can be "programmed" via the banks of miniature *switches* common on most printers. Another example of this overlap of definition is the portable data collection devices which are becoming so prolific. This includes portable *bar-code readers,* optical character recognition (OCR) readers as well as many others. These machines can be programmed to perform a wide variety of functions from reading and storing collected data, to regurgitating this information upon request, after performing any number of operations upon that same information. A more "conservative" example of a "COMPUTATIONAL DEVICE" would be the central processing unit *(CPU).* These units still exist within modern systems but generally reside within one chip. This varies from computer to computer, but some common examples of the single chip CPU are the Z80A 8-bit chip made by Zilog or the 8086 16-bit chip made by Intel. These chips are in fact so compact that most machines have several CPU chips. Only one is used as a CPU, the others are all dedicated to discreet functions such as communications. The actual setting of the function of any computational device, or programming it, is covered under "SOFTWARE".

INPUT DEVICES

Under a general definition these devices are very simple to understand. They are any device upon which data can be input. This includes keyboards (not screens), bar-code readers, OCR readers, punched card readers, paper tape readers and many others. They may vary from input-output devices only in as much as they are primarily designed to pass information only "to" the central processor.

OUTPUT DEVICES

As their name implies, output devices are those units which primarily function as an output medium from the central processor. This includes such things as printers, screens and voice synthesisers. In simple terms, an output device is usually designed to communicate information to a human operator.

INPUT-OUTPUT DEVICES

The reason for categorising this group of equipment on its own is because these devices play such a major individual role. So far we have covered the various units which are used to get information into a computer, process that information and pass the result back. This section exists for those devices which store information whilst it is not in use. Easy to understand examples of these devices are magnetic tape drives and disk drives. These may be used to perform a host of functions ranging from storing individual programs between uses, to storing end of month account figures. With the rising sophistication within both the traditional input and output devices there is also a necessity to increase the amount of information that flows in the "reverse" direction. This "reversal" is used to further enhance the ease of use of these devices by setting them via their programmable capacities to "ask" the host system for further instructions. This is however, touching on the area of Software. For the sake of clarity it is more convenient to consider input-output devices as mass storage units.

Hardware is only the necessary bits (no pun intended) of wire, plastic and whatever other SOLID objects are required to carry out the programmed instruction/s, which are converted to electrical impulses and magnetic images. (Are they HARDWARE or SOFTWARE).

The success or failure of using a computer system largely depends on the choice of software.

Software is a pre-determined series of instructions (written in a computer language) that performs specific tasks.

There are a number of computer languages in use and new ones are appearing constantly. The more common languages are CBASIC, MBASIC, CB80, ASSEMBLER, COBOL, FORTRAN, PASCAL and FORTH. The reasons for the introduction of new languages are:

1. to take advantage of new hardware modifications that may occur
2. for use in a specific area of industry, e.g. Fortran is particularly useful for scientific software.

A *package* is a group of software programs linked together to perform a specific function, e.g. Debtors/Accounts Receivable package. A program or a series of programs (like debtors) would be an accumulation of thousands of o the microworld.

SOFTWARE

lines of *code* which would be compiled and error checked to form a Package. It could possibly take many thousands of man hours to write a package. A *compiler* is another piece of software that is used for making the hardware (computer) understand the code. What might be 2000 lines of *source* code (e.g. CBASIC); once compiled might be 5 lines of *object* code. If the hardware had to reach each line of source code, it would take forever, compared to a fraction of the time taken to read the object code.

A package when purchased is supplied as a disk and a manual. On the disk there is object *"run time code".* This is a means of protecting the writer of the program from having his program pirated. It also prevents the user of the package from making changes, and hence enables the supplier (or the writer) to *support* the user. A package is designed to sell multiple copies. WordStar (word processing) is an extremely good example of a package, which is written so well it requires little or no support, and has become somewhat of an industry *standard.*

A package is different from a *Turnkey* system. A Turnkey system is to specification for usually one customer. This is a very expensive operation and its greatest advantage over a package is the flexibility. It's greatest disadvantage is the initial cost. The cost is not so much in writing the source code, but in the error checking and documentation. A turnkey system is necessary for probably 20% of small businesses, their system being unique.

Data Base packages have allowed a great amount of flexibility, but their limitations must be known before a commitment to a project is made. A data base is a *core* of object code (commands) that can be used to manipulate data.

There is a common rule in computers *'Garbage In, Garbage Out'.* If there is wrong input there, is wrong output. It's not the computer that makes the mistakes but usually the operator. For example the program as displayed on the CRT may say (using our Debtors again) 'ENTER DEBTOR NUMBER'. If an invalid number is keyed into the available space, the program will reject it. So a program must be designed not only to know what to do with real data, but also what to do with garbage. If a wrong but valid number were keyed in, a wrong debtor would be displayed on the screen. This is one example of why it is important to look for the special features of a package. Some debtors' packages access the customer by a number, whereas others do it by the name. It seems a little more personal to access by name and not a number.

Software is always in a state of change by their authors (a turnkey system will often require continued programming support). The purpose of *updating* is to offer extra features which may not have been incorporated in the initial design. Updates will not affect the data but maybe just add an extra feature, which can be used in all future inputs, e.g. an extra rate of sales tax. Updates should be made available at no charge.

Software will exist *forever,* whereas hardware will not. So it is important that the software/hardware combination is somewhat 'standard'. Will another make of hardware run the software?

For hardware to be functional it must have a *software system* (package) to control it. This is called System Software or the *Operating System.* The hardware will not function without an operating system. The small cassette based hardware models have ROM (Read Only Memory) and this contains the operating system software. The larger disk based systems have on each disk a copy of the system. When a disk (with the operating system on it) is loaded into the machine, the operating system is transferred into the processor (RAM). A CP/M operating system normally has 64k of available RAM. The operating system then becomes *resident* in the RAM; but to become resident here, some of the available RAM is used — approximately 7k. One k is 1000 characters (bytes).

A package is often a series of programs, and when we use one of these programs (e.g. debtor enquiry) the program containing this function is loaded into the RAM. So the size of the program is limited by the available RAM of the Hardware Unit. Some examples of Operating Systems or Systems Software are CP/M80 (formerly CP/M) CP/M86 and MSDOS. There are many types of software packages available "off the shelf".

They are divided roughly into 7 groups:

1. Financial Modelling
2. Word Processing
3. Bookkeeping/Accounting
4. Data Base Management
5. Games
6. Communications
7. Languages

Of most importance to the majority of computer users is Accounting Software.

This is an *integrated* suite of programs, e.g. Debtors, Invoicing, Stock. It is important to assess the difference between Accounting software and Business software. *Accounting* software as the name implies requires that the user has some knowledge of accounting. Accounting is a *profession.* There are accounting packages written for accountants to look after multiple clients. Business software records the same functions that exist in a business situation, the control of stock via Invoicing and Debtors. We sell an item, we create an invoice, deplete the stock held, and invoice the debtor account. Most businesses have a *bookkeeping* system in column format, there are packages that emulate this system and of course require very little training. To implement a Business software system is not something that is done overnight, but over many *months.* Data must be entered, e.g. all the debtors and their details. An accountant in an accounting firm should be used in assessing business software. It is your business and the day you commit to a hardware/software combination is the day that the manual system begins to become *obsolete.*

CONCLUSION

A good piece of software will last *forever,* so choose carefully. Software manipulates data in its own way — it is specific to that package. One cannot use the data from one Accounting/ Bookkeeping System, with another Accounting/Bookkeeping System.

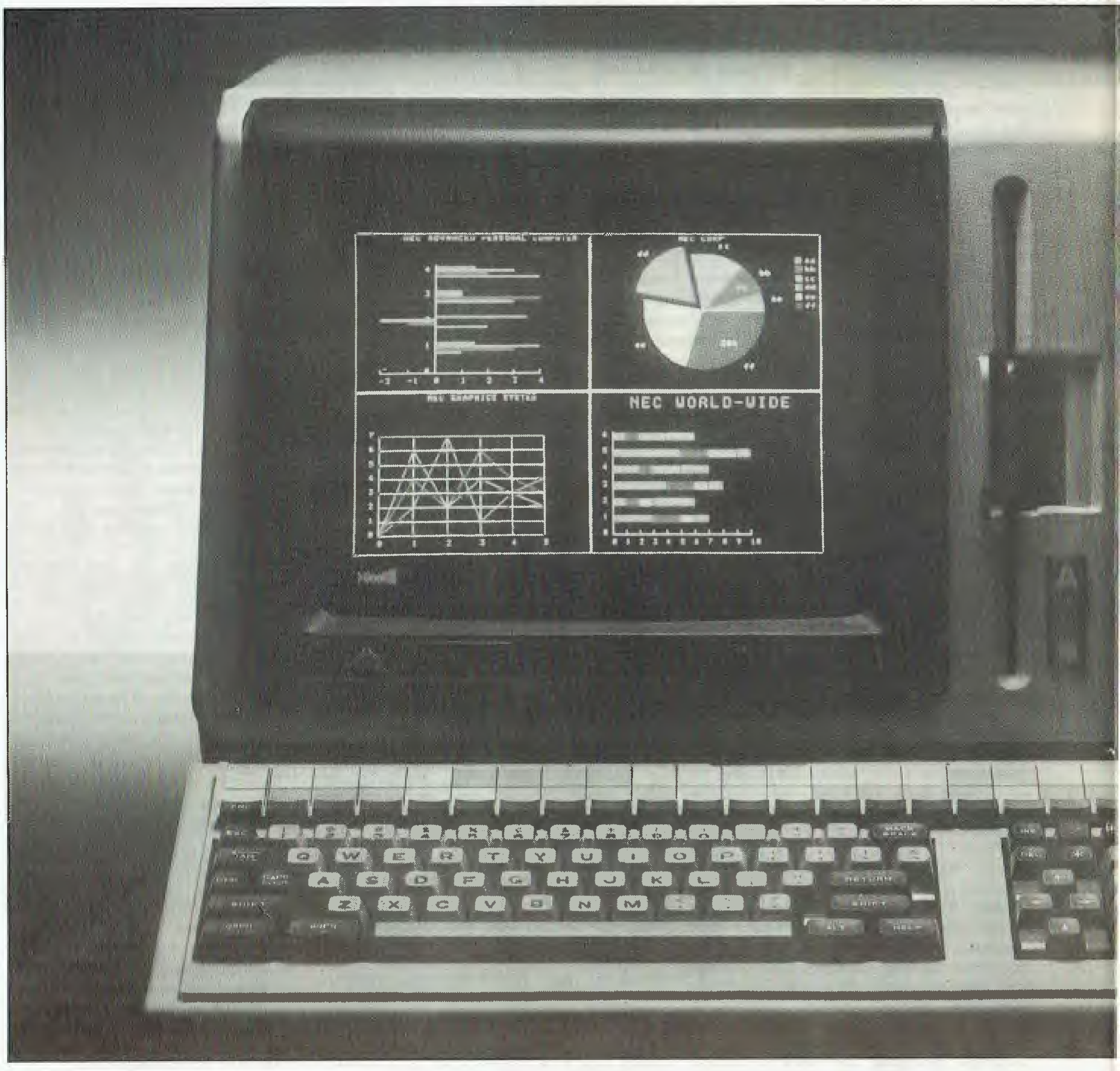
The above content is a guide to the lay person to help in the understanding of the terminology used in the jargon filled world of computers. Remember *"Garbage In, Garbage Out".*

NEC APC

DAVID TEBBUTT GETS THE OPPORTUNITY TO SCRUTINISE ANOTHER ORIENTAL OFFERING IN THE MICRO STAKES AND PUTS NEC'S APC UNDER THE SPOTLIGHT

Whenever a business microcomputer is delivered for testing, my first thoughts are: 'What on earth am I going to say about yet another twin disk, separate keyboard, standard software machine?' But each system tends to have its own personality, its own peculiar blend of good and bad points, and it's this of course that makes reviews a worthwhile exercise.

When I first laid my hands on the NEC APC, I thought I'd never get to like it. It was odd really, because the machine looks quite nice and it is certainly very well made. Getting it out of the box and onto my desk was pretty strenuous since it weighs 34 pounds (36 if you include the keyboard). Perhaps that coloured my initial feelings or perhaps it was the fact that it contains two 8in disk drives, just when I was getting used to 5¼in and 3½in



drives. There's nothing wrong with large disks; in fact they hold up to 1Mbyte of data each, which makes for a very healthy amount of information and programs at your fingertips. Perhaps it was the fact that I could see so much potential in the machine but I knew I'd have to plough through seven or eight manuals to master its innermost secrets. Anyway, whatever it was, it is very hard for me to pinpoint now because I'm at the other end of the project looking back and my feelings are a lot more positive.

As you might expect from a large Japanese company, the product is beautifully made and contains a number of thoughtful touches: the top, sides and back are in a one piece moulding which can be removed simply by slackening two screws; the printed circuit boards are held in a five-slot card cage and each board has removal levers attached to its top edge; and the keyboard contains back tab and keys for switching into various graphics and character modes. My most serious complaint about the quality of the hardware is the fact that the disk drives can get quite noisy when they're very active.

The machine looks nice and is very well made.

Hardware

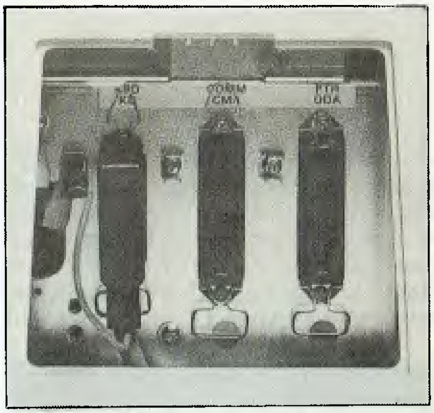
The casing of the APC is mainly cream with the exception of the keys on the keyboard and the screen surround, which is black. The machine has only three controls beyond the keys themselves and they are conveniently located at the front of the machine. The recess, caused by the APC screen and disks overhanging slightly at the front, contains the brightness and volume controls as well as the on/off switch. It also provides a useful niche for the keyboard when it's not in use. The unit is extremely robust and is obviously built to last.

of a 5ft coiled lead, is divided into three areas. The keys of the qwerty part are all light grey apart from the controls (shift, caps lock, etc.) which are black. The numeric pad blends light grey and black in a similar way but it also has four cursor control keys in dark grey. These are positioned in a North, South, East and West arrangement. At the top of the keyboard are 22 function keys together with their own shift called FNC giving 44 functions altogether. All but six of these are user-definable and can contain multiline instructions (e.g. 01,ERA*.BAK DIR would tell the key definition utility to encode function key one with the commands to erase backup files then list the new directory). For some reason that I've not yet fathomed out, the six protected keys issue the string [0 followed by one of the letters O to Z, depending on which key is pressed. The function keys have no positional relevance, they are simply stretched across the top of the keyboard, but they are accompanied by a channel which will hold a template of the available functions.

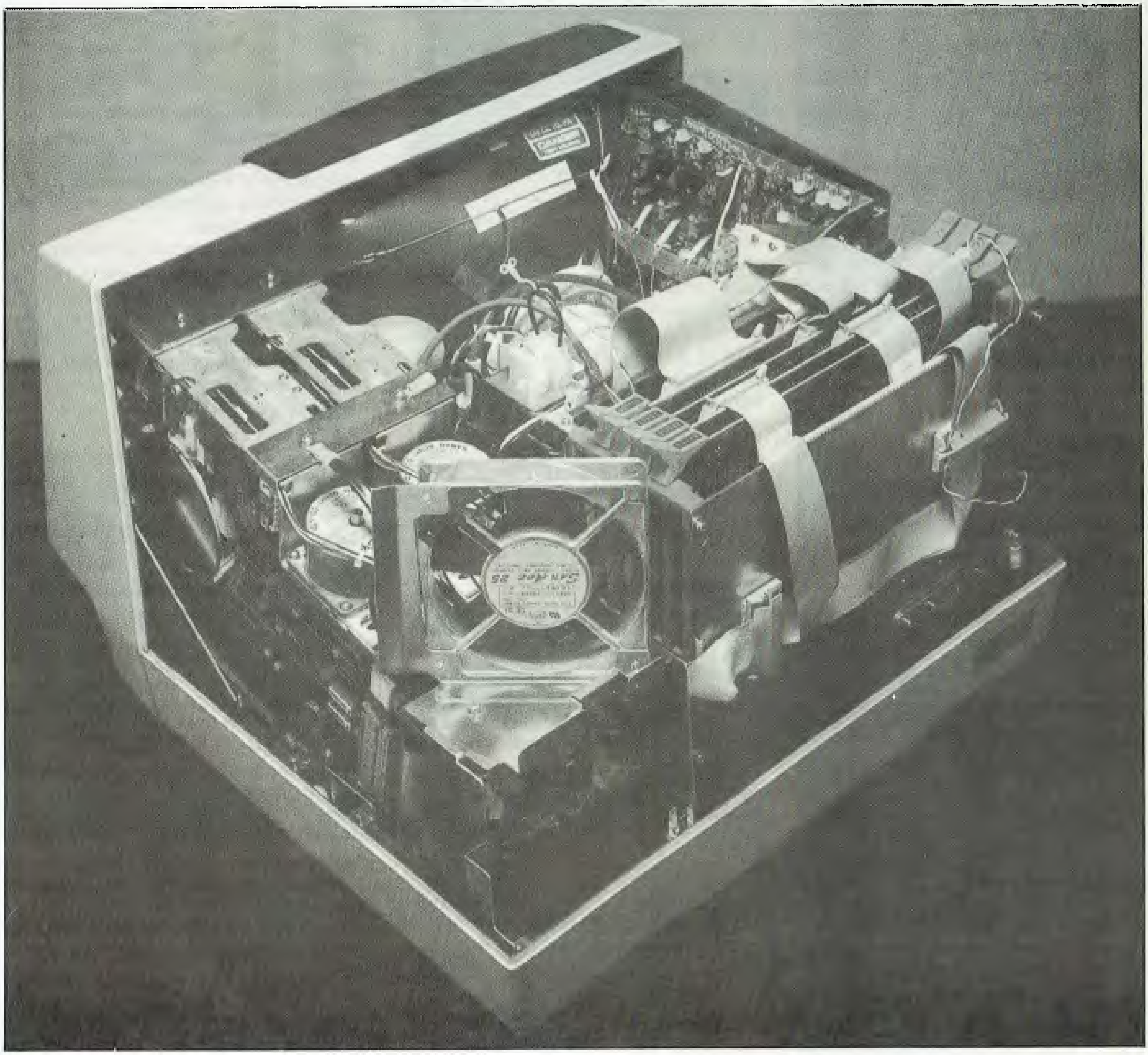
The machine lent to us for the test incorporated a colour monitor, two 8in vertically mounted, slim-line disk drives, 256k of memory a colour graphics board and a peripheral controller which I didn't use. People with no use for colour may buy a monochrome version of the machine tested. It is also possible to buy a single disk drive, monochrome system but that sort of configuration is more likely when the APC is being used simply as a terminal to a host machine. A 9.3Mb hard disk is available from NEC although I was unable to test this. The peripheral controller was, I presume, to drive a parallel printer. Since NEC is a printer manufacturer, you won't be surprised to learn that the company recommends the use of its printers with this system.

The 12in screen comprises 25 lines of 80 characters or 640 x 475 pixels. The graphics boards each contain their own RAM which means that both graphics and text may be superimposed on each other. The APC can display around 500 different characters and if that's not enough, it also allows you to define an additional 256 characters of your own. Rummaging through the APC standard character set, I came across a clock face, a little man, a superscripted '2', a floppy disk and a few fractions. Each character position on the screen comprises 8 x 19 pixels and within this you can define your own characters up to 8 x 16. This means that you will find it impossible to define characters which can join up vertically but NEC has anticipated that need by offering a fairly wide range of joined-up line drawing characters of its own. Normal characters occupy an area of 7 pixels by 11. The utility which helps you design and store your own character sets is mildly irritating because you need to hold the shift key down all the time you're using it. The programmer decided that pixels should be set by an asterisk and unset by the space bar. Asterisk on the APC is above the number 8. Ho hum. This whole area became a source of frustration to me because, despite what it says in the brochures, I could not get the ALT key to access the user-defined graphics. Either I had a broken keyboard (tut, tut) or the brochure's got it wrong (tut, tut again). I could print 'my' characters one at a time by prefixing each with ESC, (and I but that didn't seem too friendly to me). Not only that, but this arcane information came from a different manual to the one which explained how to define the characters in the first place. A few black marks there I think, NEC. The dot matrix printers supplied by NEC will print your own design graphics but to a resolution of 8 x 8.

Colour can be changed using another escape sequence, so, for example, if you prefer magenta listings simply enter ESC, [, value and m where value relates to the



Keyboard ***connector****, comms and centronics printer ports.*



The moulding can be simply removed to reveal the printed circuit boards.

colour required. You may choose from red, green, blue, yellow, magenta, cyan, white and black. If you need to use the machine for plotting then you will be pleased to learn that pixels may be coloured individually which makes for extremely high quality graphics. Although the review machine had the graphics board, I didn't have the software tools to develop any pixel graphics programs. I did, however, manage to get hold of a demonstration suite and check that the facilities are as good as they sound. Later in the test I will introduce you to the software NEC will be providing for this type of work. Monochrome graphics needs its own 128k of RAM while colour needs 384k. This memory is mounted on the same board as the graphics circuitry and doesn't eat into the user's 'normal' memory.

Now here's a thing which baffles me. Programmers just seem to love getting tunes out of machines which simply weren't designed to play music. It's happened again. If you want a ghastly rendering of some Bach piece (I couldn't hazard at guess at which) then you *must* listen to it on the APC. It's truly awful. It does illustrate the fact that the machine can cope with a couple of octaves, three different tones, dfferent volumes and a range of notes from a 32nd to a whole note. In addition it has four tempos. I can only conclude from this obsession with music on business computers that the manufacturers think that speech synthesis is on the cards in the reasonably near future.

The APC contains three types of memory: RAM, ROM and CMOS RAM which is battery backed This means that for at least two years after switching off the APC, it will still remember the information you put into the 4k of CMOS RAM. The only evidence I had of this action was that the APC did keep remarkably accurate time and it always knew the date. I did set the date to February 28th 1984 and it rather foolishly took me to March 1st at midnight. One of the brochures told me that it could be used to remember things like function key assignments. I scoured the manuals but couldn't find out how. It certainly didn't do it automatically. The 8k ROM contains the bootstrap and self testing programs. The machine comes with 128k (16 x 64k x 1 bit) RAM which can be extended to 256k. You don't need any extra RAM for graphics but you can save yourself an expansion slot by having 128k of 'normal' RAM tucked away on your graphics board. The APC has a theoretical memory addressing capability of 1Mbyte so it will be interesting to see if anything is developed to soak up this potential.

The things which irritated me in this section of the test were really firmware problems. The hardware itself is quite excellent. The four-layer PCBs look just, er would you believe, beautiful? You can buy extra PCBs to handle communications and a 32-bit floating point mathematics processor which offers speed increases of 25 to 100 times over mathematics performed on the 8086. This is clearly only useful in processor bound applications with a high mathematical content.

Software

I've already mentioned a few bits and pieces of firmware and system software. Here are a few more interesting facilities. The speed at which the screen displays can be varied by hitting CTL plus a number key. If you really want to screw up somebody's demonstration, try setting this value to '0' when they're not looking. You can set a key click on or off, and unlike some machines I know, APC has the sense not to keep hooting when characters are being repeated. Each character can possess any combination of the following attributes: overline, underline,' inverse, strike through, highlight and blinking in addition to one of the colours mentioned earlier. General display functions comply with ANSI standards while direct cursor addressing can be handled by ANSI or ADM-3a escape sequences.

CP/M-80 allows you to stop and start a display by using CTRL-S, you can still do it with the APC but it also has a BREAK/STOP key which does the same thing. Similarly printing can be toggled on and off using the PRINT key. CTRL-P still does that job as well. Again, unlike many systems, if the printer is not on or not attached, the APC invites you to do something about it. The system used to have a reset button at the back of the keyboard. I suspect that this was quite often pressed in error because this system can only be reset now by pressing FNC, CTRL and BREAK all at the same time. At least you can't possibly do that accidentally. You can even power off through software. APC supply a program called 'POW' which does the job for you. This is quite useful if you leave the machine running a batch stream and want it to close down when the work is complete.

This certainly beats the way one of my friends handled a similar problem in the late sixties. He was running a system which was notoriously slow because it used paper tape as the main means of input and output. As the workload increased, he spent more and more time waiting for jobs to finish in the evening so that he could switch the machine off and go down to the pub. This particular machine used a workstation with a moving carriage, rather like a typewriter, except it was about three times as long and ten times as heavy. He realised that this thing could build up quite a velocity if CR was hit when the carriage was positioned at the extreme right hand end. He drilled a hole in the on/off switch at the wall and programmed a CR as the last instruction of all his long-running programs. He fixed a hook in the ceiling and tied a piece of string to the switch, looped it over the hook and tied the other end to the platen knob on the right hand end of the carriage. At the end of the job, the carriage would whizz across, snatch the string just before the end of its travel and off would go the main switch. I seem to remember he still claimed the overtime for his late shift. Ah well, back to the APC.

The screen display is held in a 4k buffer so you can use CTRL and up arrow to scroll back up to look at things that have disappeared off the top of the screen. You get about one screen's worth of invisible information even if there's only one character per line. With a graphics chip, the screen acts as a window on an area 1024 x 1024 pixels and you can (according to the documentation) pan over this area which sounds like a lot of fun. Other things mentioned in the documentation which were impossible to test were zooming and partitioning. Apparently you can define windows in which all activity takes place without disturbing its surroundings.

I did get to read the CBasic manual with the graphics extensions which are designed to work with Digital Research's GSX. I got the right manual but the wrong version of CBasic because it flagged all my graphics instructions as errors. The extra commands are boxed elsewhere in this test but basically (ugh! Geddit?) they allow you to define graphics windows, set the scale, plot, fill, set colours, define the angle at which character strings are to be printed and define the line drawing style to be used. There are others but that gives you the general idea. GSX is an extension to CP/M-86 and it sets up a thing called a GIOS to handle all graphics calls from application programs. It looks a very useful extension to CP/M-86 and not at all difficult to use.

Talking of CBasic (well, I was just now), I was astonished to see how slow it is. CBasic is compiled which means that it should run faster than interpreted Basics. Well, this one didn't. Apart from Benchmark 7, it was slower than interpreted MBasic on the IBM, for example. CBasic, incidentally, doesn't like the word END to occur before the end of a program listing. I substituted the word STOP and the Benchmarks ran just fine. I won't tell you how many days it took me to figure out what was wrong but future Benchtesters please note. Don't get too upset by different Benchmark timings, they are only massively relevant if your application is largely processor-bound. Most systems spend more time waiting for operators to do something than they lose by slow program execution.

Users of CP/M will feel right at home with CP/M-86. It has got some interesting extras but it is still the same old CP/M that we know and love. Of course, people who have never heard of CP/M will probably find it a bit of a pain. I mean, how on earth is PIP supposed to mean anything to an accountant? On the other hand, the addition of a command called HELP is a good idea. This lets you display the contents of helpful information files on disk. It's just as well it's there because our accountant friend can then look up the word PIP which happens to be explained reasonably well. I can't help feeling that it would have been better to have made CP/M-86 more friendly. The KEY command allows you to define the role of each function key using up to 15 letters. Escape sequences can be encoded so I set a number of keys up to provide me with the various colours. I could then Benchtest away merrily in a colour to suit my mood. Right now it's yellow — what do you make of that? I forgot to mention earlier that there's even a colour called secret. I suppose it's quite useful for people having to type in passwords. The function keys are a real bonus when you have to perform repetitive tasks frequently. I set up one to compile programs, one to link them and another to execute them. It meant that I could perform each function with just three keystrokes. Not bad, huh?

Application software

I was supplied with several packages (not included in the price) — a word processor, a mailing list manager and a spreadsheet system. I gave the word processor a try since it was in the APC livery and it was fine. Nothing about it made me want to shout its praises from the rooftops. On the other hand I have no desire to rubbish it either. It was adequate, usable and seemingly reliable. It had the odd idiosyncrasy such as having to enter numbers for menu options. Someone please tell me what's wrong with mnemonics? The colour scheme was a little garish but it was easy to use and reasonably intuitive. The manual was very good. I gave the other two packages a cursory look and they seemed okay too.

Have a look at an NEC advertisement of their NEC (you know: 'Just voted personal computer of the (last) year') for a list of accounting and other packages available for the APC. All the usual IMS, Attache etc suites are mentioned — it's not as if NEC has gone for some weirdo processor chip/operating system combination.

ASYNC and BISYNC packages means that your communications requirements are pretty well taken care of. You can let the APC pretend to be an IBM work station by using the 3270, 3780 or HASP versions of BISYNC. Alternatively you could use ASYNC to let the APC think it's an ordinary terminal attached to another computer, an APC perhaps. Data can be handled in binary or ASCII format and incoming data can be stored on to the APC's disk.

Documentation

I was given seven official manuals and two unofficial ones. The NEC manuals were all bound in plastic ring binders which were textured to make them feel like suede. I didn't like the feel, I quite liked the manuals though. It's amazing what a clear layout and typesetting does for one's attitudes to documentation. Apart from the Word Processor and Mailing List Manager, both called Benchmark by the way, I had two CP/M manuals — one for programmers and the other for users, an operator's guide, a maintenance guide and a system reference guide.

The operator's guide simply tells how to unpack, assemble and operate the equipment from a physical point of view. The system reference guide isn't a lot of use unless you happen to be an engineer because it's jam-packed with circuit diagrams and timing charts. The maintenance guide is in the same category as the last one which leaves us with the CP/M guides and the application guides. I can't help feeling that there should be something deeper than the operator's guide but less complex than the CP/M guides. If there isn't then I think there will be an awful lot of frustrated users out there who know they're sitting on something good but can't put their fingers on the information they need to make the thing give of its best.

Don't get me wrong, all the manuals are good but there really is something missing. I had to hunt around for the information I needed and most users just wouldn't know where to start looking, or even what they were looking for.

Prices

The machine I tested cost $7,500 which sounds like a lot of money to me. You would have to buy programs, a cable and printer on top of that so you are starting to talk about $10k for a complete system. I think it would be fair to compare the product with a quality motor car — if you want something that is undeniably well made and will therefore probably be reliable, then this could be a system to put on your short list. If you can afford to lose a bit of computer time here and there then you may be able to find similar facilities at a lower price. If you can live without colour for a while, this does knock $1200 off the price. Whatever you do, don't buy a single drive system if you are planning to use it as a free standing micro. The hassle you go through trying to secure your disks will cost you more than you save in a very short time.

Hardware (incl. sales tax)

Monochrome, single drive	$4053
Monochrome, dual drive	4914
Colour, dual drive	6138
Mono graphics	891
Colour graphics	1539
Printer Cable	105
9.3 Mbyte hard disk	4110

Software (incl. sales tax)

CP/M-86	$175
Benchmark Word Processor	625

DBase II	869
ASYNC	390
BISYNC (each)	1099

Conclusions

This machine is one of the best quality offerings I have ever evaluated. It is beautifully made and will almost certainly prove to be a reliable workhorse. Of course, you find that you have to pay for this quality and I'm not at all sure if it isn't just a little bit too expensive. The manuals are well presented but there appears to be a gap in the range between the very basic operator's guide and the CP/M-86 user's guide. If you're looking for a top quality business computer, then this machine should be on your short list for consideration.

Benchmarks

CBasic (compiled)

BM1	2.3
BM2	2.3
BM3	13.7
BM4	17.6
BM5	17.8
BM6	32.0
BM7	34.8
BM8	37.1

All timings in seconds. For an explanation and listings of the Benchmark programs, see Australian Personal Computer (ABC's sister publication), see Vol. 3 No. 11, November 1982.

Technical specifications

Processor	8086, 5MHz
Memory	8k ROM, 4k CMOS, 128k RAM, additional 128k option
Disks	8in double sided, double density 1 Mbyte each
I/O	RS232C up to 19,200 baud
Screen	12in colour or monochrome 25 lines x 80 chars, 640 x 475 pixels
Keyboard	109 keys (22 function, 25 numeric pad)
Language	CBasic
Graphics	Screen is a window (640 x 475) on 1024 x 1024
Sound	2 octaves 4 speeds 32nd to whole note 3 tones

CBasic graphics extensions

BEAM	Pen on/off
BOUNDS	Set aspect ratio
CHARACTER HEIGHT	As % of Y length
CLEAR	Clear screen + pen off
CLIP	Prevent drawing exceeding boundary
COLOR	Set foreground colour
COLOR COUNT	Assign number of colours to variable
DEVICE	Assign physical device limits to variables
GRAPHIC CLOSE	Close current device
GRAPHIC INPUT	Accept X, Y coordinates from cursor position
GRAPHIC OPEN	Initialise graphics and set output device
GRAPHIC PRINT	Alphanumeric string at given point
JUSTIFY	Position text
LINE STYLE	Solid, dashed, dotted, dashed-dotted
MARKET HEIGHT	Size of special markers
MARKER TYPE	Symbols
MATFILL	Draw filled polygon from array of coordinates
MATMARKER	Draw markers according to array of coordinates
MATPLOT	Connect points defined by array of coordinates
PLOT	Connect series of coordinate pairs together
POSITION	Set beam position or assign it to a variable
STYLE COUNT	Assign numbers of styles to a variable
TEXT ANGLE	Approximate angle for text printing
VIEWPOINT	Define window boundaries
WINDOW	Define scale of X & Y axes

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PERSONAL STANDARD

IS PERSONAL CP/M THE CLOSEST YET TO A MULTI-COMPATIBLE OPERATING SYSTEM? PETER TURCAN ANSWERS

A standard in personal computer operating systems may at last be approaching. The thoroughly tiresome task of rewriting and re-rewriting software to run on different machines could become a thing of the past.

Personal CP/M, the little brother of CP/M 2.2, is not only going to mean that applications will run on different machines, but also that users will have access to a whole warehouse of software that already exists. Exciting, isn't it! Well, perhaps not quite that exciting yet. It does mean that computer manufacturers will have to take on the idea, and licence personal CP/M. Unless they do the whole thing will flop.

The main difference between personal CP/M and CP/M 2.2 is that this new version can be burned into a ROM, and integrated into the initial design of a computer. This is important in the home computer market, as many users will not have disks, and many will not upgrade to them. Having an operating system in ROM implies that there is no reliance on any form of secondary memory.

This should mean that even the smallest computers can be designed to take Personal CP/M. The system requires 4 to 6.5k of ROM, and if the disk I/O functions are removed, this drops to between 2 and 4k. This small memory requirement makes it easy for ROM packs (such as game cartridges) to be slotted into the directly addressable memory space, without having to do any paging or bank switching.

One of the main, and totally justifiable criticisms of CP/M 2.2 is its user hostility. There are about 3 million CP/M computers installed. Just think of all those users fretting over that cringing response 'BDOS ERROR ON A'. Digital Research has, at last, got its act together on producing a presentable user interface.

Another package from Digital Research is one called VIP (Visual Information Processor). This is in effect a user friendly interface for CP/M, and can be used with their other versions of this ubiquitous operating system. The idea behind this is that software houses will use it in conjunction with their own software packages, presenting the user with a consistent interface. One of the

FIG. 1

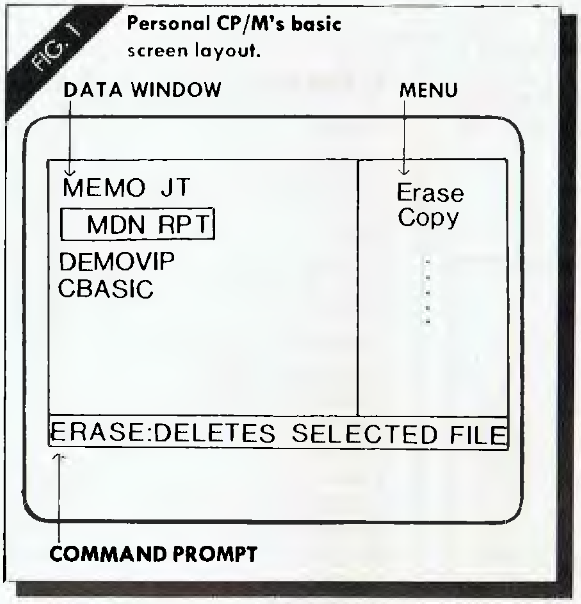
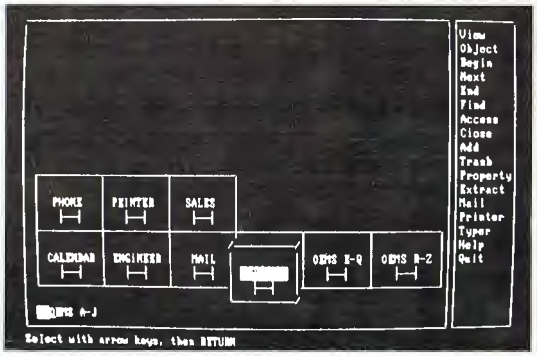


Figure 1 (above) shows the basic design. There are essentially three main areas of the screen: the 'data window' (where information appears), the menu and the prompt line. Not only have the silly command names been dropped (like PIP), but the prompt line actually tries to explain the command too.



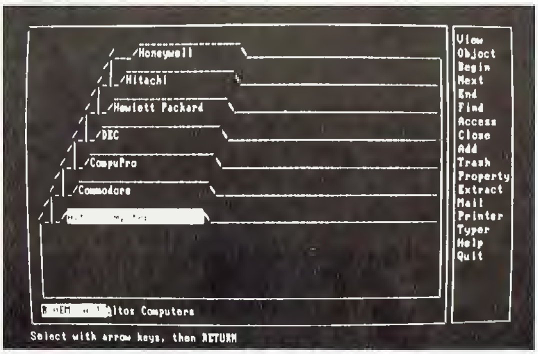
```
Select with arrow keys, then RETURN
```

The VIP facility enables a set of 'filing drawers' containing data to be 'pulled out' by the user.

real bores of this game is having to learn a complete new set of instructions every time a new package is used. VIP, should remove a lot of this tedium.

Apart from being compatible with CP/M 2.2, Personal CP/M has a few other interesting features. It is not restricted to the 8-bit processors (the Z80 and 8080), and can be extended to work on the 8086 and 8088 16 bit chips. It will also support communications for data I/O. The device dependant module of CP/M is called the BIOS, and this could support communication protocols (transparent to the user, you'll be glad to hear) that would allow connection to other computers, modems and even cable TV.

One of the main differences that a home computer user would notice, if they were to change to personal CP/M, is that the Basic interpreter is no longer doubling as the user interface. On most current home computers Basic is used for file handling. It is preferable, in theory at least, to free Basic from this task, and to use a dedicated language independant operating system.



Select with arrow keys, then RETURN

This shows a detail of the 'opened' file-drawer.

Basic can still reside on disk or in ROM, but would simply be another program that can be run. Likewise Pascal, Forth and whatever can all use the same, consistent operating environment.

One of the main competitors for personal CP/M as a home computer standard is MSX. The main differences between it and personal CP/M are that it requires 32k ROM (as it does use Basic as the user interface) and that little software currently exists for MSX.

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